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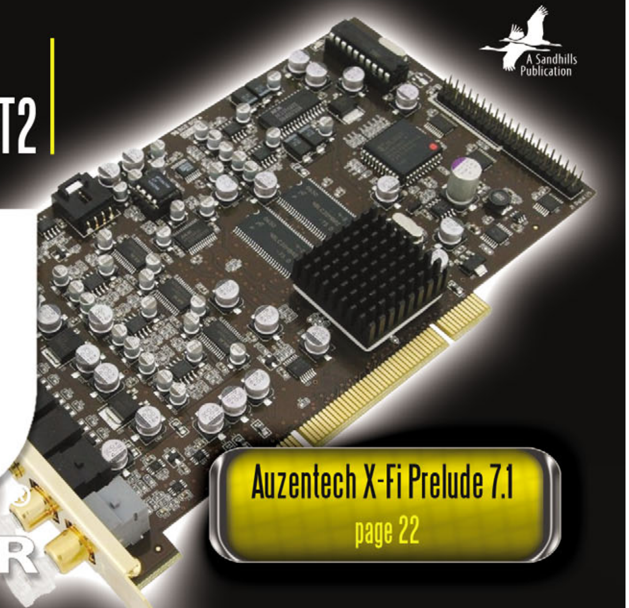

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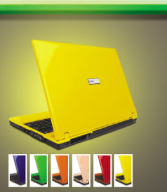

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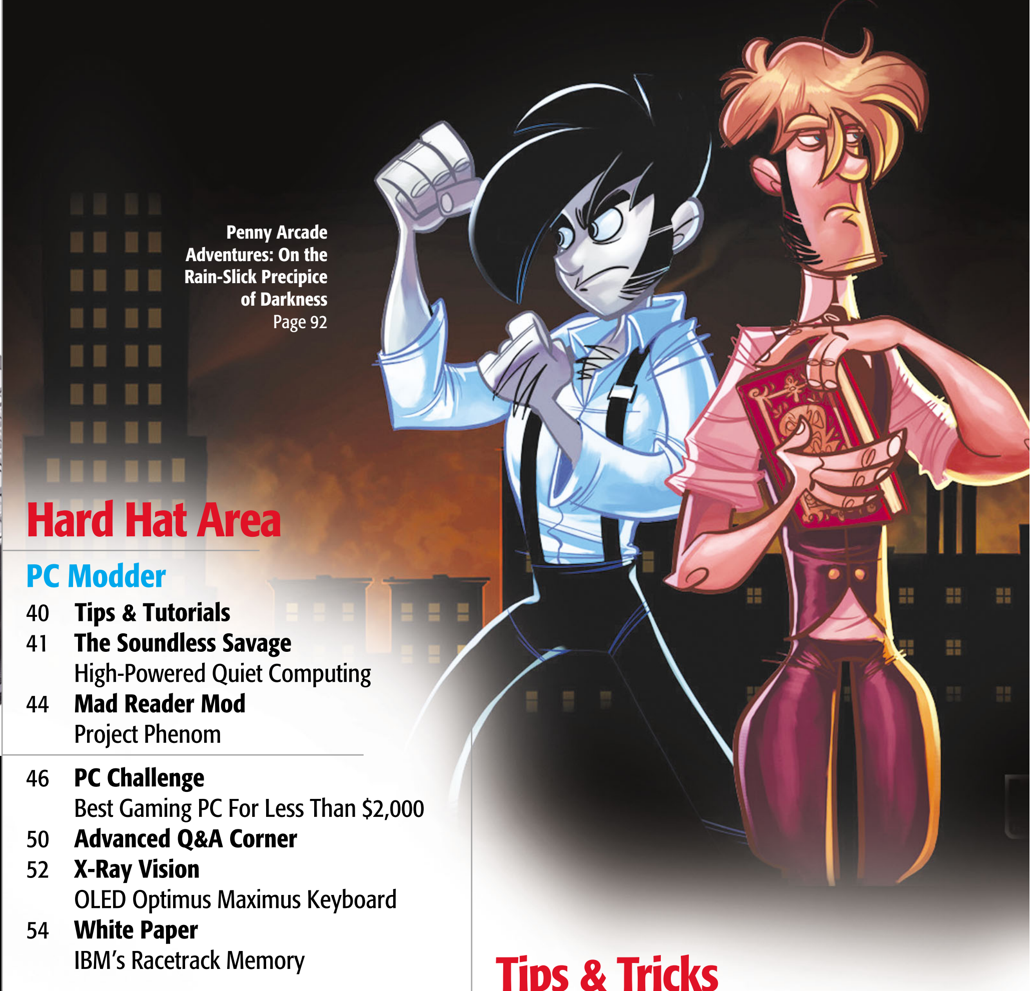

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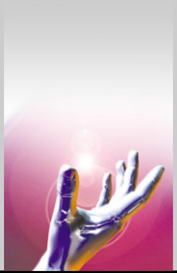

# EDITOR'S NOTE

If you joined us last month, you may recall my mention of some new/old CPU feature that would appear in this issue and, to use the food channel parlance, kick things up a notch. If it seemed as though I was being intentionally vague all those weeks ago, it's because I was. By now you've no doubt seen mention of it on the cover and you know I'm referring to the return of the PC Challenge.

If you're unfamiliar with the PC Challenge, which hasn't shown up in these pages since the April 2003 issue, it's a contest in which two CPU staffers compete to build a better PC. Their builds must be of a particular system type, which varies from challenge to challenge, and the cost of all parts used must fall within a strict budget. In this issue, staff writer Andrew Leibman and I vied for the fair-day goose in building sub-$2,000 gaming PCs.

My hesitance to come right out and tell you what was coming was partly an oh-so-clever ruse to whet your appetite, but indeed there was more to it. I was also somewhat hesitant to promise you a feature that a month earlier wasn't just incomplete; it was unstarted and to a large degree unplanned.

You see, in the olden days, CPU staffers participating in the PC Challenge went out into the wild reaches of the Internet to find their parts wherever they could, a sort of silicon scavenger hunt, if you will. This method certainly had its merits, but for this issue, we worked solely with the good folks at Newegg, who provided us with every part used in both builds. As you can imagine, there were i's to dot and t's to cross, and their people needed to talk to our people, etc. But the guys at Newegg were great to work with, and in the end it all came together. In the very end. Literally.

There were speed bumps along the way (especially for my hapless victim), but if you enjoy reading the article even a tenth as much as we enjoyed putting it together, it will have been well worth the effort.

**Chris Trumble, Publication Editor, *CPU***

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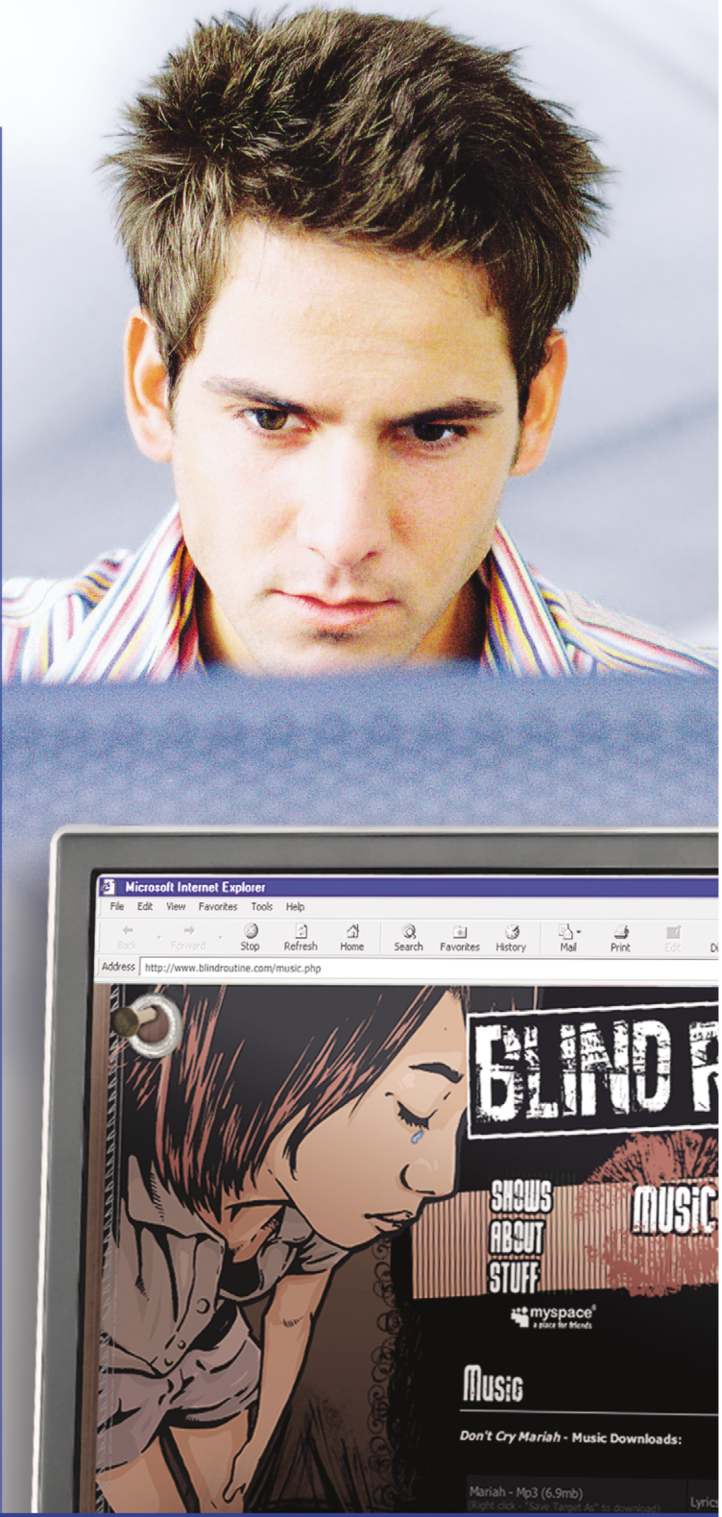
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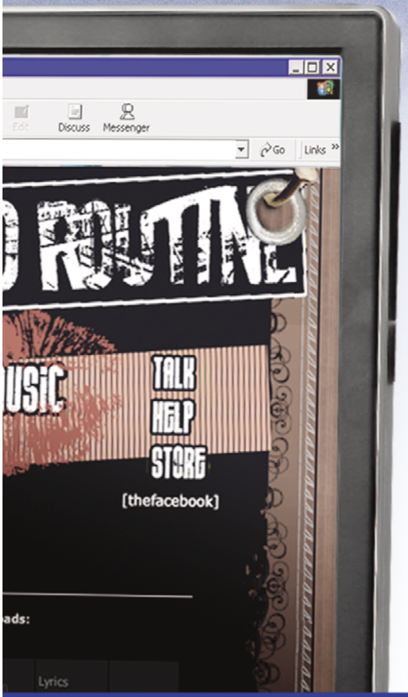


Compiled by Blaine Flamig

## Netbooks Sprout Up Like Weeds

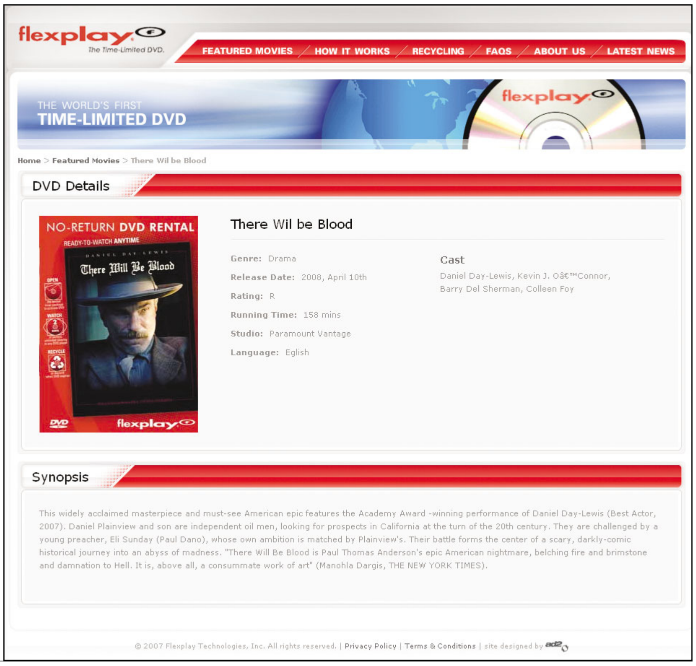
We're pretty sure not even Asus anticipated the influence its massively popular Eee would have on the progress of mini-notebooks, or "netbooks." Following this year's Computex, we not only have a new Intel Atom-based Asus Eee 901 (8.9-inch screen) and Eee 1000 (10-inch) series models in Windows XP and Linux flavors upon us but also the Acer Aspire One (8.9-inch screen; Intel Atom-based); HP 2133 Mini-Note (VIA C7-M-based); FIC International CE2A1 (VIA C7-M-based) and CW0A1 (Intel Atom-based); and an upcoming 3G-supporting, Linux-running, Snapdragon-based model from Qualcomm. Further, Dell also released photos of what looks to be a future mini-Inspiron. Apparently not satisfied with a million-plus sales of Eee minis, Asus also announced an Atom-based desktop Eee Box ($269) at Computex. ▲

## Apple Rules Retail PC Sales

Through early 2008, Apple accounted for 66% of all U.S. retail outlet sales of systems costing $1,000 or more, according to analyst NPD Group. The percentage climbs to 70% when counting only desktops. (Apple notebooks accounted for 64% of sales, NPD reports.) A major caveat to the domination is that NPD's report omits online sales, where Dell is still king. Additionally, NPD included sales at Apple's own 200-plus stores, which, of course, only sell Apple gear. Meanwhile, research firm Forrester recently predicted Apple will also rule the home by 2013 via the Mac platform, home servers, universal remote, photo frames, clock radios, enhanced Apple TV, and other devices. ▲

## Poof! Self-Destructing DVDs Resurface

As we headed to press, Staples was reportedly planning to sell $4.99 movies on DVDs that self-destruct after two days. Removing one of the Flexplay-manufactured DVDs from its packaging "exposes the disc to oxygen, triggering a gentle, controlled chemical reaction" that after 48 hours begins "to interfere with the DVD laser beam's ability to read the disc." Flexplay, which has been in the DVD self-destruction business for about five years, states its patented technology causes the chemical reaction to occur completely within the DVD. If the concept sounds familiar, that's because DIVX (no, not that DivX) tried something similar about 10 years ago, which bombed at the box office. ▲



Home > Featured Movies > There Wil be Blood

DVD Details

There Wil be Blood

Genre: Drama

Release Date: 2008, April 10th

Rating: R

Running Time: 158 mins

Studio: Paramount Vantage

Language: Eglish

Cast

Daniel Day-Lewis, Kevin J. Oâ€™Connor, Barry Del Sherman, Colleen Foy

Synopsis

This widely acclaimed masterpiece and must-see American epic features the Academy Award -winning performance of Daniel Day-Lewis (Best Actor, 2007). Daniel Plainview and son are independent oil men, looking for prospects in California at the turn of the 20th century. They are challenged by a young preacher, Eli Sunday (Paul Dano), whose own ambition is matched by Plainview's. Their battle forms the center of a scary, darkly-comic historical journey into an abyss of madness. "There Will Be Blood is Paul Thomas Anderson's epic American nightmare, belching fire and brimstone and damnation to Hell. It is, above all, a consummate work of art" (Manohla Dargis, THE NEW YORK TIMES).

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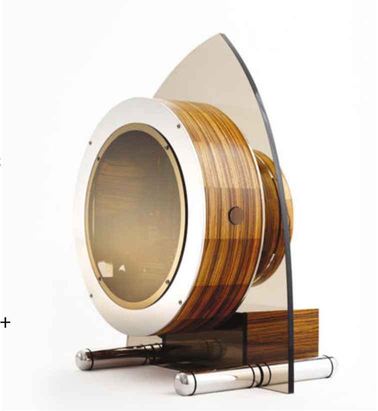
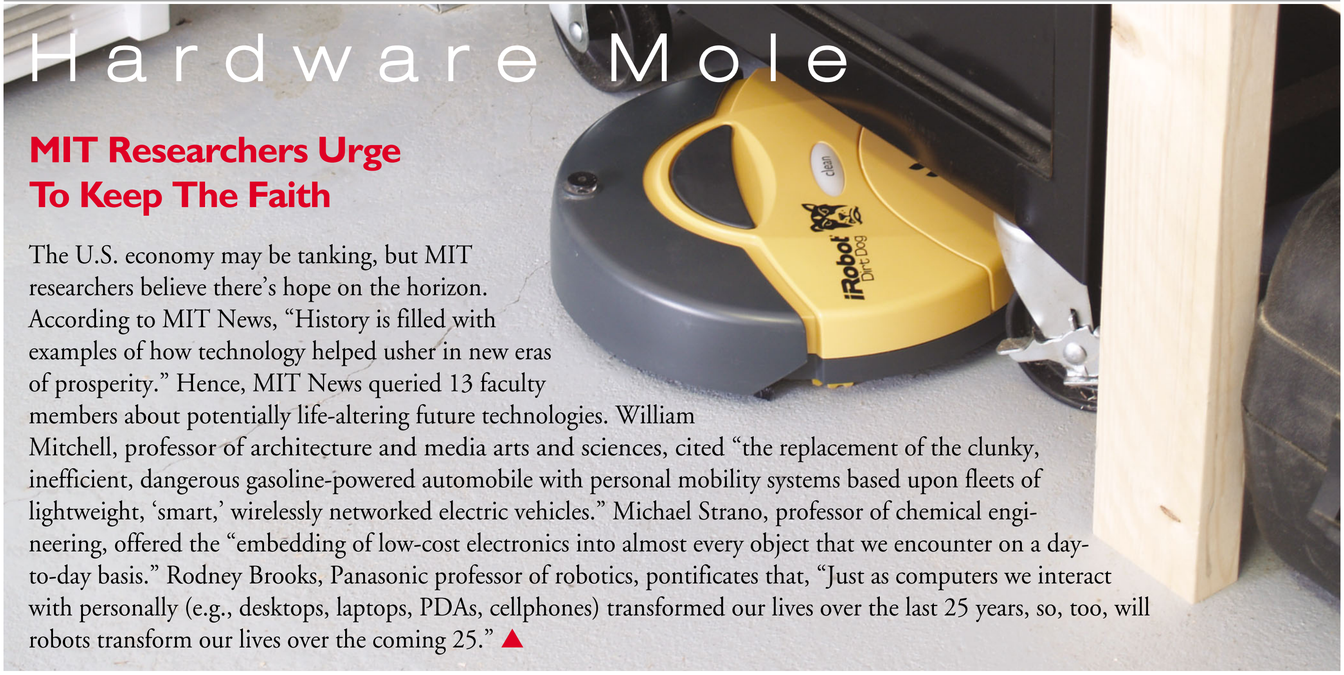
## Suissa Enlightens The PC



Although pricing and availability details are still sketchy, what is clear about Suissa Computers' jaw-droppingly seductive and wood-based Enlighten PC is that the Canadian manufacturer plans to only create 10 commissioned models, according to its Web site. Finding words to describe the Howard Suissa-designed Enlighten isn't easy, so we'll let Suissa Computers have a crack at it: "The visually dynamic form explores the modularity of technology, reflects the movement through time that our memories occupy, and provides a tangible home for them." Planned for the inside of this looker is a micro-ATX mobo with either an Intel Quad Core or AMD X2 6400+ CPU, Nvidia GeForce 8800GTX or ATI Radeon HD2900XT, 4GB of PC6400 RAM, 1TB of storage, DVD drive, and 620W PSU. Now, if you'll excuse us, we have gawking to do. ▲



# Hardware Mole

## MIT Researchers Urge To Keep The Faith

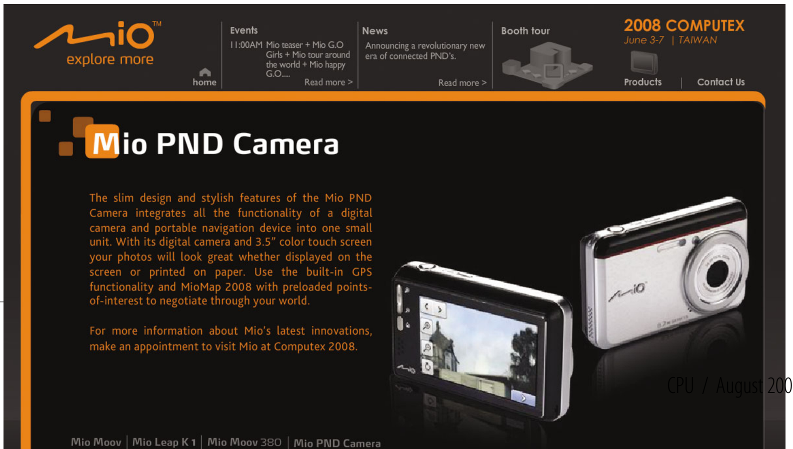
The U.S. economy may be tanking, but MIT researchers believe there's hope on the horizon. According to MIT News, "History is filled with examples of how technology helped usher in new eras of prosperity." Hence, MIT News queried 13 faculty members about potentially life-altering future technologies. William Mitchell, professor of architecture and media arts and sciences, cited "the replacement of the clunky, inefficient, dangerous gasoline-powered automobile with personal mobility systems based upon fleets of lightweight, 'smart,' wirelessly networked electric vehicles." Michael Strano, professor of chemical engineering, offered the "embedding of low-cost electronics into almost every object that we encounter on a day-to-day basis." Rodney Brooks, Panasonic professor of robotics, pontificates that, "Just as computers we interact with personally (e.g., desktops, laptops, PDAs, cellphones) transformed our lives over the last 25 years, so, too, will robots transform our lives over the coming 25." ▲

## Gaming Consoles & Plasma TVs Guilty Of Guzzling

How much energy can a Playstation 3 suck up in a year? According to Australian consumer agency Choice, if powered 24/7, the console could cost you $250 in electricity, or five times more than a medium-sized refrigerator. Stop snickering, Xbox 360 owners. Choice reports your console isn't far behind. "While we hope no one actually leaves their game console on for a whole year 24/7, the figures are indicative of just how much electricity these small devices can chew their way through," states Christopher Zinn of Choice. Plasma flat-screen TVs ranked second among the 16 electronic devices Choice tested. Further, Choice stated the iMac uses two-thirds as much power as a PC. ▲

## Mio Tags Digicam With Portable Navigation Device

Netbooks weren't the only devices making news at 2008's Computex. In addition to announcing details about new smartphones, Taiwanese manufacturer Mio presented plans for a compact PND Camera, which reportedly will combine a GPS device with an 8.1MP digicam sporting a 3.5-inch touchscreen and optical zoom lens. Although official specifications are scant at best, there's some thought among industry experts that Mio could have a winner on its hands in this relatively unchartered space if it can present a battery-friendly device that snaps quality shots users can tag with geographic data while providing reliable navigation. ▲



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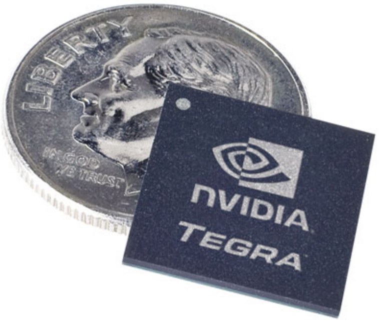
For more information about Mio's latest innovations, make an appointment to visit Mio at Computex 2008.

Compiled by Dean Takahashi

## Samsung Quietly Builds A $4 Billion Business For Applications Processors

Samsung Electronics has quietly built a $4 billion business providing chips for consumer-electronics gadgets, such as the iPod and the iPhone, and portable navigation devices such as the Dash Express. But the company is taking the same ARM-based technology in those chips and moving into emerging categories such as digital photo frames and mobile Internet devices. Samsung can expand into these markets by reconfiguring features on its applications processors, which include everything necessary for a complete system on a single chip, such as multimedia, mobile TV, 3D graphics, communications, imaging, and basic user interface controls. Richard Yeh, director of marketing for the System LSI business at Samsung Semiconductor, says that the company's applications processors balance both performance and power. At some point this year, Samsung will launch ARM-based chips using the latest ARM Cortex A8 core with speeds greater than 667MHz. When those processors are launched, you can expect to see ever more capable portable devices that can access the Internet. ▲

## Nvidia Uses PortalPlayer To Spring Into Portable Chips



Samsung isn't the only company moving into mobile Internet devices, of course. Nvidia hopes that its graphics chip expertise will give it an edge in making applications processors for mobile phones and mobile Internet devices—both of which have bigger and bigger displays nowadays. Nvidia launched a new brand, Tegra, at the Computex show in Taiwan. The brand includes the APX 2500 (launched earlier) for phones. One feature: It can play high-definition videos on a big screen via an HDMI wire. The Tegra brand also features the new CSX line of chips that can run on a single watt of power and still power screens with displays that are four inches to 12 inches. The Tegra line comes from the core assets of PortalPlayer, which Nvidia bought for $357 million. ▲

## Watching The Chips Fall

Here is pricing information for AMD and Intel CPUs.

*Retail price
** Manufacturer's price per 1,000 units
Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

| CPU | Released | Original price | Last month's price | Current price |
|---|---|---|---|---|
| AMD Athlon 64 X2 Dual-Core 6400+ AM2 only | 8/20/2007 | $251** | $163 | $169 |
| AMD Phenom X3 Triple-Core 8750 2.4GHz | 3/27/2008 | $195** | $234 | $195** |
| AMD Phenom X3 Triple-Core 8650 2.3GHz | 3/27/2008 | $165** | $165 | $165** |
| AMD Phenom X3 Triple-Core 8450 2.1GHz | 3/27/2008 | $145** | $145 | $145** |
| AMD Athlon 64 FX-70 | 11/30/2006 | $599/pair | $215 | $217 |
| AMD Athlon 64 FX-72 | 11/30/2006 | $799/pair | $319 | $315 |
| AMD Athlon 64 FX-74 | 11/30/2006 | $999/pair | $361 | $329 |
| AMD Phenom 9550 | 3/27/2008 | $195** | $212 | $195** |
| AMD Phenom 9600 | 11/19/2007 | $283** | $236 | $236 |
| AMD Phenom 9600 Black Edition | 12/23/2007 | $251** | $229 | $229 |
| AMD Phenom 9750 | 3/27/2008 | $215** | $214 | $215** |
| AMD Phenom 9850 Black Edition | 3/27/2008 | $235** | $255 | $235** |
| Intel Core 2 Duo E6750 | 7/16/2007 | $183** | $177 | $174 |
| Intel Core 2 Duo E6850 | 7/16/2007 | $266** | $169 | $184 |
| Intel Core 2 Duo E8190 45nm | 1/7/2008 | $163** | $163** | $163** |
| Intel Core 2 Duo E8200 45nm | 1/7/2008 | $163** | $184 | $173 |
| Intel Core 2 Duo E8400 45nm | 1/7/2008 | $183** | $194 | $204 |
| Intel Core 2 Duo E8500 45nm | 1/7/2008 | $266** | $269 | $450 |
| Intel Core 2 Quad Q6600 | 1/8/2007 | $851** | $217 | $219 |
| Intel Core 2 Quad Q6700 | 7/16/2007 | $530** | $265 | $279 |
| Intel Core 2 Quad Q9300 45nm | 1/7/2008 | $266** | $279 | $279 |
| Intel Core 2 Quad Q9450 45nm | 1/7/2008 | $316** | $496 | $496 |
| Intel Core 2 Quad Q9550 45nm | 1/7/2008 | $530** | $858 | $620 |
| Intel Core 2 Extreme QX6700 | 11/14/2006 | $999** | $425 | $465 |
| Intel Core 2 Extreme QX6800 | 7/16/2007 | $999** | $628 | $832 |
| Intel Core 2 Extreme QX6850 3GHz 8MB cache 1,333MHz FSB 65nm | 7/16/2007 | $999** | $1,009 | $979 |
| Intel Core 2 Extreme Quad QX9650 3GHz 12MB cache 1,333MHz FSB 45nm | 11/12/2007 | $999** | $1,039 | $1,029 |
| Intel Core 2 Extreme Quad QX9770 3.2GHz 12MB cache 1,600MHz FSB 45nm | 2/19/2008 | $1,399** | $1,469 | $1,489 |
| Intel Core 2 Extreme Quad QX9775 3.2GHz 12MB cache 1,600MHz FSB 45nm | 2/19/2008 | $1,499** | $1,548 | $1,548 |

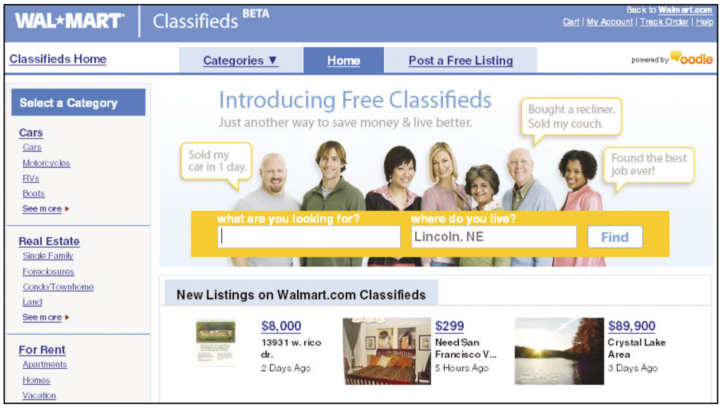
## Apple Prompts Speculation With PA Semi Purchase

Apple's $278 million purchase of the microprocessor design firm PA Semi has raised speculation about Apple's intentions. PA Semi was founded by Dan Dobberpuhl and other members of the original DEC Alpha and StrongArm processors. It was making low-power, high-performance PowerPC chips for Apple. But when Apple switched to Intel chips, PA Semi had to shift into the networking and military markets. The chip designers are quite capable of designing PowerPC chips, but Apple has abandoned those. They could also make x86 designs, but that would mean war with Intel. Or they might make low-power ARM-based chips for use in Apple's iPhones and iPods. Or maybe Apple just needed to acquire chip patents to defend itself against possible lawsuits. Still, it's very unlikely that Apple paid so much money just to mothball a star team. ▲

Compiled by Blaine Flamig

# Walmart.com Posts Oodles Of Classifieds

Depending on what your stance is on behemoth retail giants, you either love or hate Wal-Mart. Either way, you have to hand it to the world's largest retailer: It's willing to experiment with its online space, as evidenced by its previous, now-discontinued online movie download effort or a new classified ad business it's partnering with Oodle.com. Still in beta, Walmart.com's classifieds tie into Oodle.com's listings, which reportedly total over 500,000 new listings daily as aggregated from 80,000-plus sites. At walmart.oodle.com, users can freely post localized listings in such categories as Cars, Tickets, Real Estate, and Jobs. At last check, 160 pages' worth of 195,000-plus tech jobs awaited your perusal. ▲



# Beware These Domains

In its "Mapping The Mal Web" report released in June, McAfee identified .hk, .cn, and .info as the most dangerous Web domains. China's .hk jumped from 28th to first in 2008. Of the 9.9 million Web sites with 256 country and generic domain names that McAfee test-drove, it deemed 19.2% of .hk sites dangerous or potentially so. Meanwhile, 11.8% of .cn and 11.7% of .info sites were tagged as risky. Conversely, the safest domains are .gov (0.05%) and .fi (0.05%). As for .com, McAfee labeled it the ninth riskiest overall. ▲

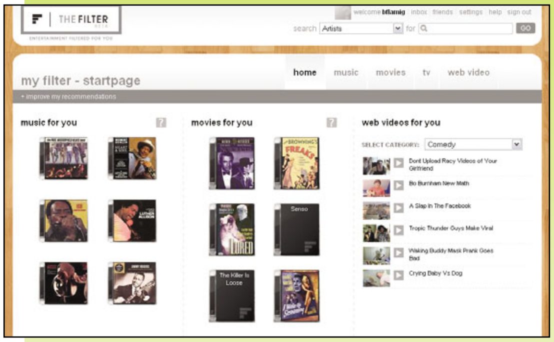
# Hot Potato, Hot Potato

In his annual report on Web user habits, usability expert Jakob Nielsen indicates that in addition to becoming more selfish with browser use, Web users hate widgets and other site features that slow page loads. Nielsen says Web users are increasingly taking a hot potato mentality toward navigating Web sites. "People want sites to get to the point; they have very little patience," he stated. Nielsen's report states Web users now have a 75% success rate in getting the online data they want vs. 60% in 1999. "Basically, search engines rule the Web," he told the BBC. ▲

# Site Seeing

## Pete Gabriel Shocks The Filter

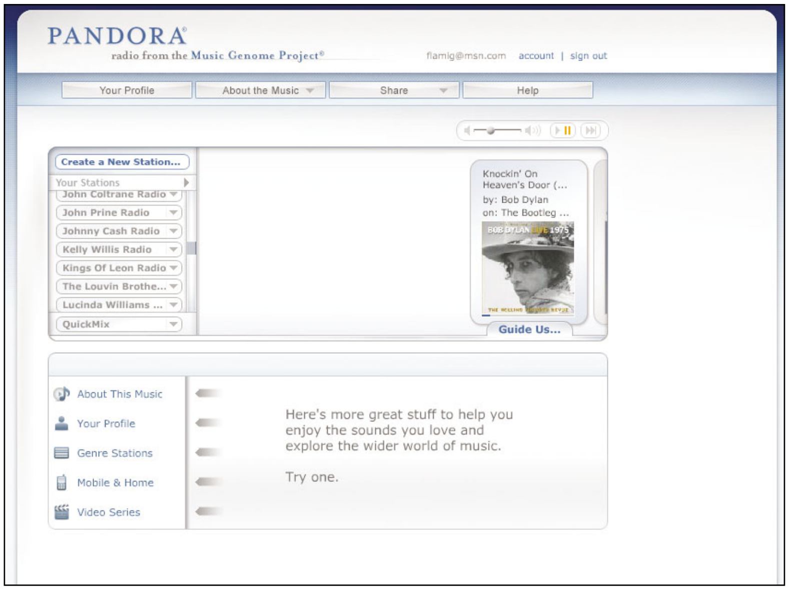
Feeling overwhelmed by the amount of music and movie choices now available? Peter Gabriel wants to help. Mr. "Big Time" has co-founded The Filter, which is "powered by an engine that provides a holistic approach to recommendations—filtering out irrelevant content and only filtering in content that reflects an individual's tastes and moods through unique algorithms." Think Amazon.com's personalized recommendations for music and movies and you get The Filter's aim. Upon signing up, you'll rate various movies and musicians based on categories you select as your favorites. The Filter then offers daily recommendations. The more you visit, the more targeted the picks become. No objections here to The Filter's Sonny Boy Williamson and "Ran" nods, thank you. ▲



## An Oldie But A Goody

Online veterans will tell you one of the handiest sites around is Refdesk.com. Since 1995, Refdesk.com has faithfully indexed "quality, credible, and timely resources that are free and family-friendly." That's a bit of an understatement, as you can easily spend hours at Refdesk.com and not begin to tap into what's available. Through such sections as Daily Diversions, Today's Potpourri, News Sources, This Day In History, Today's Pictures, Weather Resources, Columns & Commentary, Help & Advice, and Top Reference Tools, there's seemingly nothing unobtainable from the lengthy home page. Dictionaries, recipes, U.S. statistics, free online security scans, gas prices, writing guides, driving directions, Web searches, games, Dow Jones averages, top Web 2.0 sites, a volcano cam, Internet traffic reports, David Letterman's Top 10 list. . . . ▲

Compiled by Blaine Flamig



Here's more great stuff to help you enjoy the sounds you love and explore the wider world of music.

Try one.

# Pandora Now Streams From The Desktop

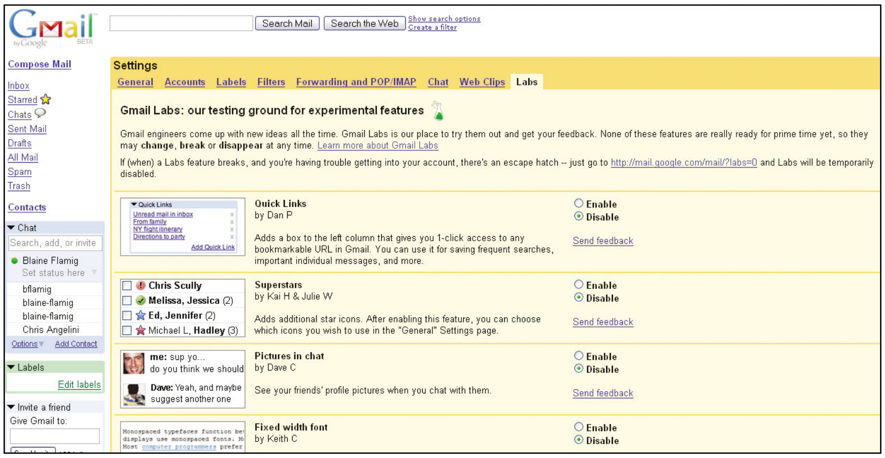
Using Adobe's AIR as its platform, Pandora released a beta Desktop version of its streaming music player in early June that, if nothing else, "ensures that you'll never accidentally browse away from Pandora and lose your stream." Overall, the Desktop version doesn't stray all that far from the Web-based implementation, especially visually. You do get handy System Tray access to basic player features, although the Desktop version's window is huge due to graphical ads Pandora will display to defray licensing costs. Check it out at www.pandora.com/desktop. ▲

# Symantec Addresses WinXP SP3 Snag

First, Symantec blamed Microsoft code (Fixccs.exe, specifically) for putting thousands of garbage entries in the Registry on systems running Symantec security software following an upgrade to Win-dows XP SP3. (Among other things, those entries resulted in emptying Windows Device Manager and causing wireless network adaptors or other hardware devices to go missing.) Next, Symantec instructed users to disable the SymProtect feature in Norton apps before installing WinXP SP3. Then in early June, the company seemingly brought an end to the drama with a SymRegFix tool designed to "remove the Registry entries that were added during the Windows XP Service Pack 3 or Win-dows Vista SP 1 upgrade." A LiveUpdate patch, meanwhile, aims to protect systems yet to get a WinXP SP3 or Vista SP1 install. ▲

# Google Gives Linux Users Gadgets

Although not quite a 1.0 release (0.9.2), Google Gadgets are now available for Linux users. Google stated at its Open Source At Google blog that, "For Gadgets for Linux, we don't just want to simply release the final offering, but we also want to give everyone a chance to tinker with the code powering the gadgets. For this project, fostering a transparent and lively developer community is just as important as serving our users." The open-source effort falls under the Apache license. Elsewhere, Google also announced Gmail Labs, which presents Gmail experimental features users can enable or disable. Depending on their popularity, some features may eventually become standard in Gmail. ▲



Gmail Labs: our testing ground for experimental features

Gmail engineers come up with new ideas all the time. Gmail Labs is our place to try them out and get your feedback. None of these features are really ready for prime time yet, so they may **change**, **break** or **disappear** at any time. Learn more about Gmail Labs

If (when) a Labs feature breaks, and you're having trouble getting into your account, there's an escape hatch -- just go to http://mail.google.com/mail/?labs=0 and Labs will be temporarily disabled.

**Quick Links**
by Dan P
Adds a box to the left column that gives you 1-click access to any bookmarkable URL in Gmail. You can use it for saving frequent searches, important individual messages, and more.
○ Enable
● Disable
Send feedback

**Superstars**
by Kai H & Julie W
Adds additional star icons. After enabling this feature, you can choose which icons you wish to use in the "General" Settings page.
○ Enable
● Disable
Send feedback

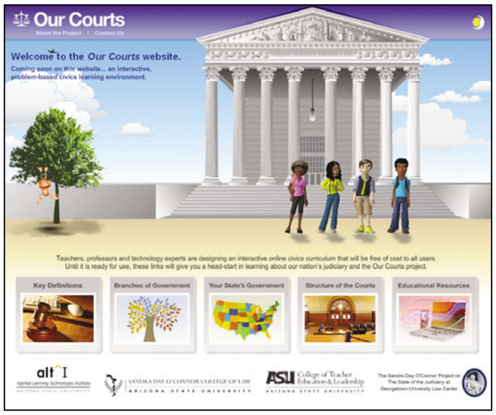
**Pictures in chat**
by Dave C
See your friends' profile pictures when you chat with them.
○ Enable
● Disable
Send feedback

**Fixed width font**
by Keith C
○ Enable
● Disable

# Software Shorts

## Sandra Day O'Connor Goes Gaming

Although she admits, "I don't play video games. Sorry," former Supreme Court Justice Sandra Day O'Connor thinks enough of gaming's potential that she's helping develop OurCourts (www.ourcourts.org), a free online game aimed at teaching kids how the U.S. court system operates. "If we can capture just a little bit of that time to get them thinking about government and civic engagement rather than playing shoot-'em-up video games, that's a huge step in the right direction," O'Connor stated. The court's first female justice promoted OurCourts at the recent Games For Change Festival. The game, which Georgetown University and Arizona State University are helping develop, should be ready by September 2009. ▲


Our Courts
About the Project | Contact Us
Key Definitions
Branches of Government
Your State's Government
Structure of the Courts
Educational Resources
alt^I
Applied Learning Technologies Institute
Arizona State University
Sandra Day O'Connor College of Law
Arizona State University
ASU College of Teacher Education & Leadership
Arizona State University
The Sandra Day O'Connor Project on The State of the Judiciary at Georgetown University Law Center

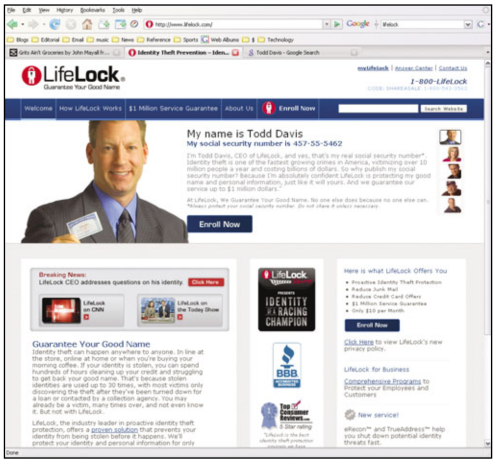
Welcome to the *Our Courts* website.

Coming soon on this website... an interactive, problem-based civics learning environment.

Teachers, professors and technology experts are designing an interactive online civics curriculum that will be free of cost to all users. Until it is ready for use, these links will give you a head-start in learning about our nation's judiciary and the Our Courts project.

## Can LifeLock Be Trusted?

We won't say CEO Todd Davis had it coming, but it's not that surprising LifeLock is experiencing some turbulence. In recent class action lawsuits, former customers claim the identity theft-protection service not only didn't work as advertised, but Davis knew it couldn't because it failed him. Davis, who touts his SSN on LifeLock's Web site and in ads, acknowledges knowing of at least 87 attempts to swipe his identity, including a successful bid that netted a Texas man a $500 online loan in Davis' name. Davis stated, "What's important is the whole incident proves that LifeLock works because I was never out a dime of my own money or a minute of my own time." LifeLock has requested the lawsuits be thrown out. Davis stated, "We were ready and believe the suits will be proved to be without merit because we follow the law and do exactly what we say we do." ▲


File Edit View History Bookmarks Tools Help
http://www.lifelock.com/
Google
lifelock
Blogs Editorial Email music News Reference Sports Web Albums $ Technology
Grits Ain't Groceries by John Mayall fr...
Identity Theft Prevention – Iden...
Todd Davis - Google Search
LifeLock
Guarantee Your Good Name
mylifelock | Answer Center | Contact Us
1-800-LifeLock
Welcome
How LifeLock Works
$1 Million Service Guarantee
About Us
Enroll Now
Search Website
Enroll Now
LifeLock on CNN
LifeLock on the Today Show
Click Here
IDENTITY RACING CHAMPION
BBB
Top Consumer Reviews.com
5 Star rating
Enroll Now
Done

My name is Todd Davis

My social security number is 457-55-5462

I'm Todd Davis, CEO of LifeLock, and yes, that's my real social security number*. Identity theft is one of the fastest growing crimes in America, victimizing over 10 million people a year and costing billions of dollars. So why publish my social security number? Because I'm absolutely confident LifeLock is protecting my good name and personal information, just like it will yours. And we guarantee our service up to $1 million dollars."

At LifeLock, We Guarantee Your Good Name. No one else does because no one else can.

*Always protect your social security number. Do not share it unless necessary.

Breaking News:
LifeLock CEO addresses questions on his identity.

Guarantee Your Good Name

Identity theft can happen anywhere to anyone. In line at the store, online at home or when you're buying your morning coffee. If your identity is stolen, you can spend hundreds of hours cleaning up your credit and struggling to get back your good name. That's because stolen identities are used up to 30 times, with most victims only discovering the theft after they've been turned down for a loan or contacted by a collection agency. You may already be a victim, many times over, and not even know it. But not with LifeLock.

LifeLock, the industry leader in proactive identity theft protection, offers a proven solution that prevents your identity from being stolen before it happens. We'll protect your identity and personal information for only

Here is what LifeLock Offers You

- Proactive Identity Theft Protection
- Reduce Junk Mail
- Reduce Credit Card Offers
- $1 Million Service Guarantee
- Only $10 per Month

Click Here to view LifeLock's new privacy policy.

LifeLock for Business

Comprehensive Programs to Protect your Employees and Customers

New service!

eRecon™ and TrueAddress™ help you shut down potential identity threats fast.

## International Hack Attacks

Perhaps U.S. Commerce Secretary Carlos Gutierrez should add some geeks to his traveling staff. That way they could tell him leaving his laptop unattended is a bad thing. According to the *Washington Post*, Gutierrez did just this during trade talks in China in December 2007. Soon after, U.S. officials reported three serious attempts to swipe data from the department. U.S. authorities are reportedly investigating if Gutierrez's laptop was compromised. Chinese officials denied such allegations in June despite claims the Chinese army previously hacked into German, British, and U.S. governmental and military networks. ▲

## BIOS Upgrades Available Online

**Compiled by Steve Smith**

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new lease on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpuaug08/bios to see our entire upgrade list.

| Motherboard | Date Available | URL |
|---|---|---|
| Aopen i975Xa-YDG 1.10c beta | 4/12/2008 | download.aopen.com.tw/userdownload_List.aspx?RecNo=11562&Model=i975Xa-YDG |
| ASRock K10N78FullHD-hSLI R3.0 1.10 | 5/12/2009 | download.asrock.com/bios/AM2+/K10N78FullHD-hSLI(1.10).zip |
| Asus G-surf365 0602 | 5/5/2008 | dlsvr03.asus.com/pub/ASUS/mb/socketAM2/G-SURF365/0602.zip |
| Biostar GF8200 M2+ 6.x N78SM408 | 4/9/2008 | www.biostar.com.tw/upload/Bios/N78SM408.BSS |
| MSI EFINITY 1.2 | 4/16/2008 | download1.msi.com.tw/files/downloads/bos_exe/E7395v12.zip |
| Shuttle SN68PTG6DELUXE SN68SP0K | 5/2/2008 | image.shuttle.com/ResourceCenter/download_file.jsp?file_id=11188 |
| Supermicro C2SBC-Q 1.0 | 3/10/2008 | www.supermicro.com/support/bios/bios_zip/SBCQ3078.zip |

# DIGITAL ECONOMY

Compiled by Steve Smith

## The Job Search

Summer vacation will be over before you know it, but don't go back to any old college when you can be part of Harvard's incoming class of IT guys. The most venerable of Ivy Leagues has multiple positions for the fall. Interested in the Humanities? The School of Arts & Sciences needs a Systems Administrator to maintain enterprise services, storage, and security. Interested in moving up to a teaching position? Well, the Faculty of Arts & Sciences (FAS) needs a Senior Web Development Manager to work on Web applications. Or, if Mom always wanted you to be a doctor, try becoming a Wireless Network Analyst for the Harvard Medical School. You'll be on call to maintain a 7x24x365 wireless infrastructure that serves all the PDAs, laptops, and desktop PCs. Okay, it's not quite the same as being a Harvard-trained doctor. On the other hand, it won't cost your parents $38,600 a year in tuition.

www.jobs.harvard.edu/jobs/summ_req?in_post_id=37497

www.jobs.harvard.edu/jobs/summ_req?in_post_id=37299

www.jobs.harvard.edu/jobs/summ_req?in_post_id=35525

**605.5 million**

Worldwide unique user visitors to Google properties

(comScore)

**4 BILLION**

Video streams served by Google's YouTube

(April 2008, Nielsen)

**5.1 billion**

Searches at Google in the U.S. market

(April 2008, Nielsen)

**19,156**

Number of worldwide Google employees

(March 31, 2008, Google)

## Information, Not Impact

The Web is a tremendous source of information for consumers, but it may not have quite the influence we presume. The latest Pew Internet & American Life survey found that 56% of recent music buyers use the Web to research products, but only 7% said that it had a major impact on their purchase decision. For cell phones and real estate, as well, only 10 and 11% said the Internet had a major influence on their final decision. In many categories, advice from friends, sales experts, and newspaper listings play critical roles in the buying cycle.

www.pewinternet.org/pdfs/PIP_Consumer.Decisions.pdf

### THE GADGETS WE OWN

According to the latest Harris Poll of U.S. adults, 87% now own a DVD player connected to their TV, and 47% own a wireless router.

| | |
|---|---|
| DVD PLAYER CONNECTED TO TV | 87% |
| DESKTOP COMPUTER | 86% |
| LAPTOP COMPUTER | 53% |
| HDTV | 35% |
| PORTABLE DVD PLAYER | 28% |
| SONY PS2 | 24% |
| NINTENDO WII | 11% |
| IN-CAR DVD | 10% |
| XBOX 360 | 9% |
| HD-DVD PLAYER | 6% |
| SONY PS3 | 5% |
| BLU-RAY DISC PLAYER | 4% |

Source: Harris Poll, U.S. adults surveyed online, April 2008
www.harrisinteractive.com/harris_poll/index.asp?PID=908

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## The Saint

by Alex St. John

# Alien Computer Design

I studied electrical engineering with minors in math and computer science at the University of Alaska back when the Honeywell mainframe was a state-of-the-art computer. My interest at that age was in designing massively parallel supercomputers. I never imagined at the time that my interest in parallel supercomputer design would ultimately manifest itself in the form of creating a multibillion-dollar consumer market for massively parallel 3D graphics accelerators for video games. Introducing a hardware abstraction layer for 3D (Direct3D) into a mainstream consumer OS like Windows enabled an explosion in 3D chip innovation because 3D chip makers were then able to innovate freely, confident in the knowledge that there would be a market and plenty of games to take advantage of their chips as long as each new chip was at least faster than its predecessors.

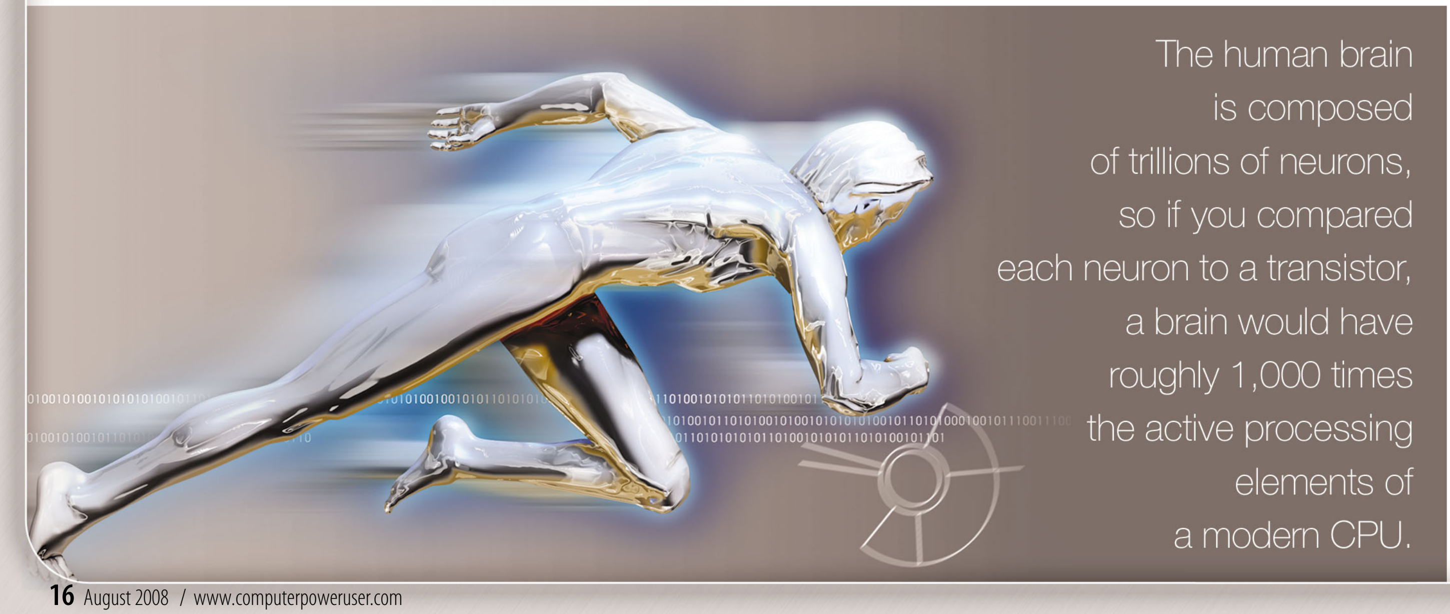
Until now, CPU innovation has marched down a path in which each generation of CPU has achieved greater performance by increasing the clock rate and increasing what I call "implicit parallelism," which achieves the benefits of parallelism without applications having to be written differently to take advantage of it. Efforts to move towards "explicit parallelism" have mostly failed. Explicit parallelism, even in its simplest forms, requires active developer adoption and greatly complicates software design. Thus, it has always been simpler for Intel to fold more implicit parallelism into what looks like a single, giant, serial CPU than it has been to get developers to support more than one CPU, core, process, or thread in their applications. The advantages of doing this, however, are reaching their limits. There are fewer and fewer everyday computing problems that benefit from greater "serial" computing performance.

Chips are also approaching certain quantum limits that can't be overcome. A CPU is really just a very fancy stovetop heating element. As transistors are packed on a die with increasing density and clock rates, their power requirements accelerate while the chip's heat dissipation capacity only scales geometrically with the chip's 2D surface area. Each gate closing blocks the flow of electrons releasing their energy as heat, turning the CPU into a very expensive silicon cook top.

The ability to tightly synchronize fast computations is reaching its limits. At a computational level, "synchronization" basically means ensuring that many tiny parallel computations all take place in the correct order to get the correct result. Today you can adjust a single clock on your PC to increase the performance of the entire system. That clock signal governs the synchronization of all transistors across the entire surface of the chip simultaneously. As chip surface area and clock rates increase, the time it takes a clock tick to propagate across the entire chip can become greater than the resolution of the tick itself. In other words, it becomes increasingly difficult to synchronize a computation because it becomes impossible to make two coordinated computations on opposite sides of a chip happen in a specific order. Thus even the implicit parallelism of modern monolithic CPU design begins to break down.

What does this mean for future computers? As I've previously pointed out, modern 3D chips are a fascinating short-term study in how tomorrow's computers may be designed, but we are also extremely fortunate to have an absolutely incredible glimpse here in the present into how computers built a century from now may look. If an extremely advanced alien civilization were to drop off one of their computers for us to study and figure out how to improve our own primitive efforts, you couldn't ask for a better gift to study than a human brain.

For example, the human brain is composed of trillions of neurons, so if you compared each neuron to a transistor (a grossly unfair comparison to the neurons), a brain would have roughly 1,000



The human brain is composed of trillions of neurons, so if you compared each neuron to a transistor, a brain would have roughly 1,000 times the active processing elements of a modern CPU.

times the active processing elements of a modern CPU. If you more reasonably compared the computing power of a modern CPU to a single neuron, you'd be comparing your PC to a computer with 100,000,000,000 times the active processing elements. According to Moore's law, which observes that the number of transistors we can add to a chip doubles roughly every two years, then the human brain is a reasonable representation of how computers in the year 2082 might be designed. That's pretty good considering that it took evolution over a billion years to design a brain in the first place. So what can we learn about the future of computing from our "alien" supercomputer?

First, it has some familiar features; it's powered by electricity, albeit generated by burning sugar at the point of computation. It's liquid-cooled, and given that the human brain consumes about 23% of our caloric intake, has power requirements of around 534 watts or around half a cup of sugar per day. One of the reasons humans may have so little hair compared to other mammals is that we had to make room for more sweat glands to dissipate the extra heat generated by our enormous brains.

And, like a modern computer chip, the brain is still more or less a 2D surface constructed in layers but then folded into a 3D shape to fit inside the skull.

Unlike modern computers, however, evolution abandoned centralized synchronization in favor of highly distributed asynchronous processing and slowed the clock rate way down. It takes roughly 1/10th of a second for a nerve signal from the brain to reach your hand, for example. With such huge latencies, how is it possible for a human being to play an instrument like the piano or a video game that easily requires sub-100ms reaction times? One of the benefits of enormous asynchronous parallelism is that distant processing elements can function entirely independently of one another. Thus the nerves in the hands can buffer up a set of behaviors without direct control from the mind.

If you want to see what playing a video game or instrument would be like if the brain were forced to control your hands directly in real time, try this experiment: Have a friend hold a dollar bill edge-wise and drop it unexpectedly while you try to pinch it as it falls between your thumb and forefinger. Unless you are a mutant, this will prove very difficult. Next, try dropping the bill for yourself and it will become easy. In the first situation, you have no ability to anticipate the drop, so your brain's slow reaction time is obvious. In the second, your brain can anticipate the drop and program your hand to close fast enough to catch the bill. Interestingly, all video games basically boil down to the strange sense of satisfaction we get when our brain is highly engaged in studying a real-time video to identify patterns it can use to anticipate future events and program our hands to react to them before they happen.

*Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is president and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM-quality entertainment content over the Web.*

One of the most interesting features of the brain is that it is not a "digital" computer, but an analog one. Modern computers work by trying to force wave-shaped electrical signals into box-shaped digital signals that encode information as either a 0 or a 1. Of course, as you increase the data frequency or clock rate of the wave, the relative dimensions of the "boxes" representing the digital signal shrink, thereby increasing their information density. Taken to its logical extreme, this observation forces you to conclude that the highest information potential of a wave is achieved with infinitely small boxes, which, of course, is an analog computer. Information in the brain is likely represented in the form of collections of asynchronously generated waves that interfere with one another constructively and destructively to collectively convey information.

One of the greatest engineering achievements of the brain is its extreme error tolerance. As Windows Vista has demonstrated, extremely complex software is extremely buggy software due (in part) to its accelerating "untestability." Modern computers crash horribly when a single bit is out of place or a single transistor out of hundreds of millions fails. You can, however, lose half your brain and still be considered functional enough to be elected to high office. ▲

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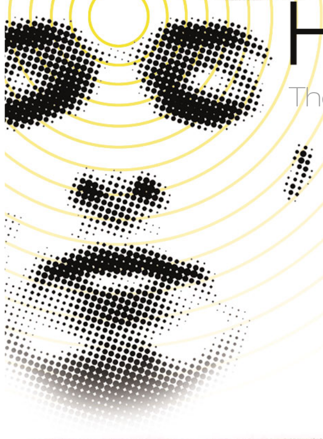
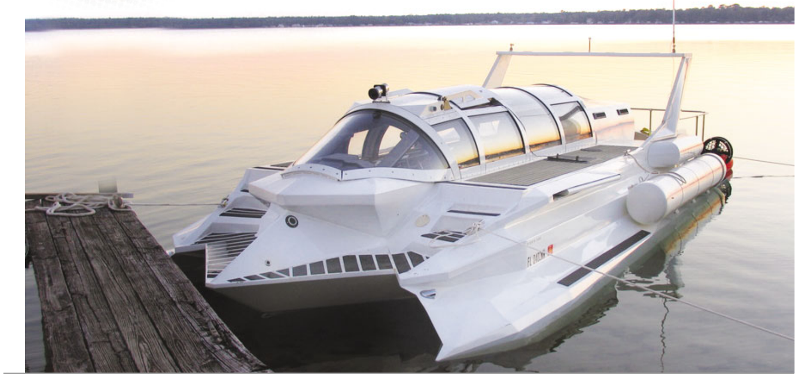
# DREAM HARDWARE

These Gizmos Don't Sing It, They Bring It



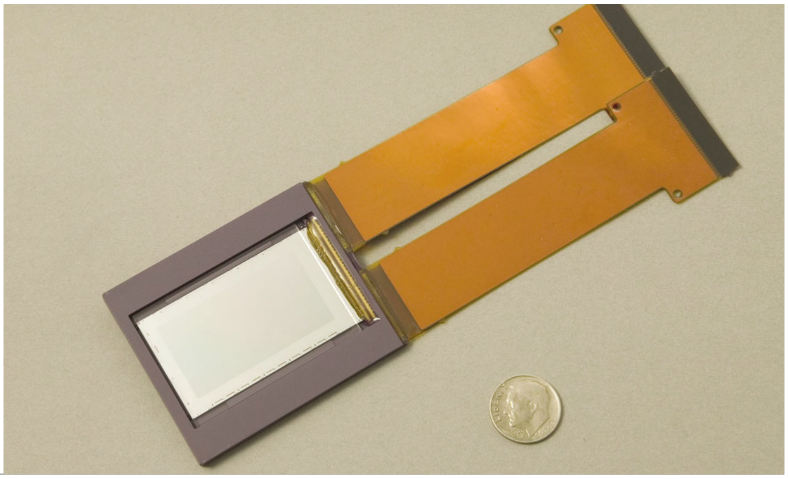
From the frigid pressures of the deeps to the frigid vacuum of space, you can bet we'll be documenting our travels with video. You'll find us in the theater, under several blankets, reliving past glories in quadruple HD.

**by Marty Sems**



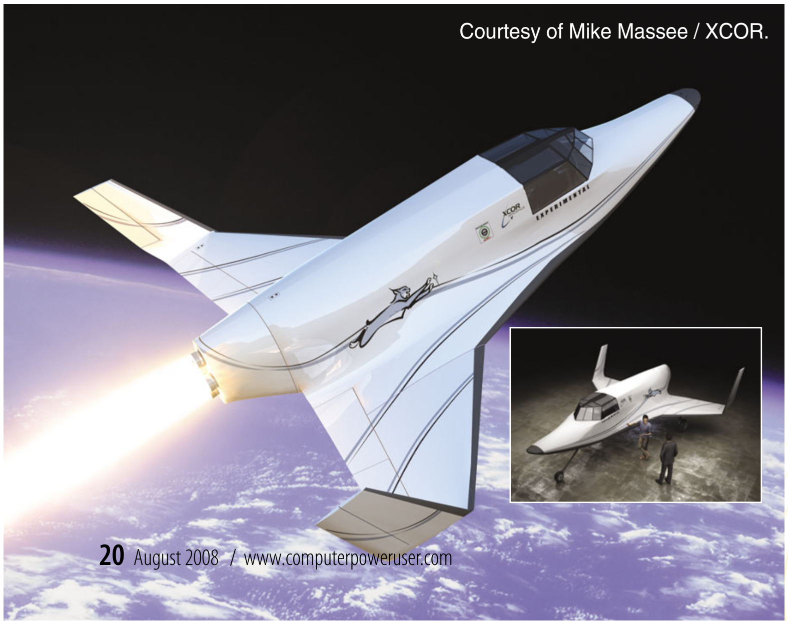
## Marion Hyper-Sub

Let it be known, all y'all, that should we come into any sort of fortune, we'll be buying some Dream Hardware, not merely reporting on it. Bullet Point One on the list is a personal submersible like the Marion Hyper-Sub (www.hyper-sub.com). (Bullet Point Two is to hire an *uber*-cool bodyguard/nanny/submarine pilot like Brock Samson on "Venture Bros.") Reynolds Marion and company are currently developing various sport and industrial models—one depth-rated to 1,200 feet—for production at undetermined, but "competitive," prices. Some of the customizable subs will have hard points for extravehicular equipment mounting, which we take to mean stuff like Oo-Rays and Walking Eyes. Buy up a local lake, hire a crusty old marine mechanic with a monosyllabic name (and a past worthy of its own story arc in Season 2), and rig for dive. Go, Team Marion!



## JVC 8K4K D-ILA

High-def 1,920 x 1,080 video looks pretty sharp on a typical HDTV, but that 2-megapixel picture doesn't hold up as well on a big movie screen. Pump up that resolution sixteen times or so; now you're talking. At 8,192 x 4,320 pixels, or 35MP, JVC's new 8K4K Direct-Drive Image Light Amplifier (pro.jvc.com) produces a 17:9 image that's actually slightly wider than NHK's Super Hi-Vision standard currently under development for broadcasting in Japan. This D-ILA might make its way into high-end projectors for digital movie theaters, ushering in a whole new era in cinema. That is, if there's any cinema left after HDTV and broadband finish stealing its audience.



Courtesy of Mike Massee / XCOR.

## XCOR Aerospace Lynx Mark I

We have ignition at the sign of the cat. XCOR Aerospace (www.xcor.com) in Mojave, Calif., has a long pedigree in the rocket science community, and it shows in the firm's upcoming Lynx. This $10 million suborbital RLV (reusable launch vehicle) is the focus of the second license for space tourism ever issued by the FAA's Office of Commercial Space Transportation, XCOR says. Using restartable liquid-fueled rocket engines, the Lynx takes off like a jet plane and lands like a glider 30 minutes later, with some memorable minutes of "microgravity" at 200,000 feet in between. The Lynx should drive down the cost of commercial edge-of-space joyrides (reportedly to about $100,000) with shorter, lower flights than those planned by Virgin Galactic. Listen for the growl of a test flight in 2010.

# Sound Card Clash

## The Best Of Add-In Audio

When it comes to CPUs, power users just can't get enough muscle. We start twitching nervously if AMD or Nvidia wait longer than six months to announce a graphics architecture update. So why is it, then, that our sound systems get off the hook so easily? We'll nitpick one IHV's implementation of 16X anisotropic filtering and then plug a 2.1-channel speaker system into the analog outputs of an integrated audio controller. It doesn't make sense. PCs are increasingly relevant in home entertainment centers, and games continue reaching for new levels of realism. You'd think that a strong sound card would be second only to graphics in an enthusiast's PC.

Perhaps the shift in the audio card market is attributable to the solid job Intel did on its HD Audio specification, compounded by a group of motherboard vendors anxious to differentiate by finally offering decent onboard sound codecs. Maybe Microsoft played a role when it rewrote Vista's audio stack and removed the hardware abstraction layer for DirectSound, nixing hardware acceleration of Creative Labs' EAX (Environmental Audio Extensions) in favor of the more stable UAA (Universal Audio Architecture).

We're inclined to believe that add-in cards sell to three types of power users: those who want better sound quality to pump through their high-end speakers/headphones; the professional crowd that's just not getting the connectivity they need from a motherboard's I/O panel; and gamers shying away from Vista in favor of WinXP. Thankfully, a handful of holdouts are keeping the add-in sound card market alive, giving enthusiasts some compelling options beyond the integrated HD Audio found on most motherboards today.

Are discrete cards still worth buying now that Vista has changed everything about audio acceleration? Do sound cards really offer an appreciable difference in sound quality over onboard codecs? We gathered up the best products from Asus, AuzenTech, Creative Labs, and M-Audio to find out.

### Time Out: Windows Vista

First, let's cover the changes to how sound is handled as you transition from WinXP to Vista. In WinXP, the audio stack exists in a number of different kernel-mode device drivers, according to Microsoft's Larry Osterman. As a result, sound is one of the leading causes of the operating system's reliability issues (tinyurl.com/3k5zgm). The audio infrastructure's struggle in supporting pro audio apps and the tools used to fix sound problems were also problematic.

Back in 2002, Microsoft made the decision to fix all of those problems in Windows Vista. The most major change involved moving the audio stack (now referred to as the UAA) into user mode. Now, if there's a driver problem and UAA crashes, it won't bring down the entire OS.

An unfortunate side effect is that DirectSound's hardware abstraction layer no longer exists, breaking hardware acceleration for technologies like Creative Labs' EAX, which extended the DirectSound3D API. Turning hardware acceleration back on requires a third-party API such as OpenAL, which can access audio hardware in Vista without involving Microsoft's defunct DS3D. As we'll see, Asus, AuzenTech, and Creative Labs each has its own solution for supporting positional audio in Vista, despite a relatively short list of titles boasting the ability to employ OpenAL (openal.org/titles.html).

The bottom line: If you're a gamer running Windows Vista, taking advantage of an audio processor like Creative's X-Fi is more difficult, but not impossible. For everyone else watching movies, editing home videos, or recording original content, Microsoft's vastly changed architecture should at least be a good hedge against sound card manufacturers and codec vendors releasing shoddy device drivers.

**Xonar D2X**
$199 • Asus • www.asus.com
●●●●

### Asus Xonar D2X

Best known for its motherboards, Asus might be an unlikely name in the sound card business. You wouldn't suspect it, though, by looking at the Xonar D2X's impressive spec sheet.

The Xonar's onboard controller is labeled as Asus' AV200, but it's really a tweaked and rebadged C-Media Oxygen HD CMI8788. Four Burr-Brown PCM1796 DACs deliver eight channels of analog output at up to 24-bit resolution and 192KHz sampling with a 123dB SNR. Cirrus Logic's CS5381 ADC similarly accommodates 24-bit 192KHz streams with a 120dB SNR. Asus rates the input and output at an overall SNR of 118dB.

If you take a look at C-Media's product page for the Oxygen, you'll notice the controller is actually a PCI device, which is interesting to note because Asus' Xonar boasts the first PCI-E x1 interfaces we've seen on a sound card. It turns out that an onboard PLX bridge chip is actually the

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◐ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

secret sauce giving the Xonar D2X its PCI-E connectivity. Although it isn't as ideal as native PCI-E, kudos to Asus for offering us something to plug into the x1 slots on so many of today's motherboards.

The Xonar's suite of onboard connectors includes six 1/8-inch jacks: microphone in, line in, and a quartet of analog outputs facilitating 7.1-channel sound. One S/PDIF-in and one S/PDIF-out smartly work with either coaxial or optical cables. Unique to any card we've ever seen, all six jacks sport colored LEDs corresponding to the connector's function. The extra bit of bling was thoughtful, especially if you're accustomed to needing a flashlight every time you fish around for 1/8-inch plugs in the back of your PC.

Because the Xonar centers on C-Media's Oxygen and is consequently not a hardware accelerator, the card's driver package is responsible for enabling all of its functionality in software. The argument from Asus is that modern CPUs are more than ample for powering audio subsystems. Performance between the Xonar and X-Fi-based competition in Unreal Tournament 3 would seem to validate Asus' claim.

We got our hands on a well-behaved beta copy of driver 6.12.8.1731 and were impressed with the polished interface. Everything about the Xonar is controlled from a single, intuitive panel. New in the latest software package is support for DS3D GX 2.0, the company's second-gen DirectSound wrapper extending support for EAX under Windows Vista. Whereas the first version of DS3D GX only worked with EAX 1.0 and 2.0, the models Creative makes freely available, Asus claims DS3D GX 2.0 supports everything up to EAX 5.0. The caveat? Asus is on record saying the software implementation of DS3D GX 2.0 is not a 1:1 reproduction of what Creative can do in hardware. Still, we had a hard time discerning between the two implementations.

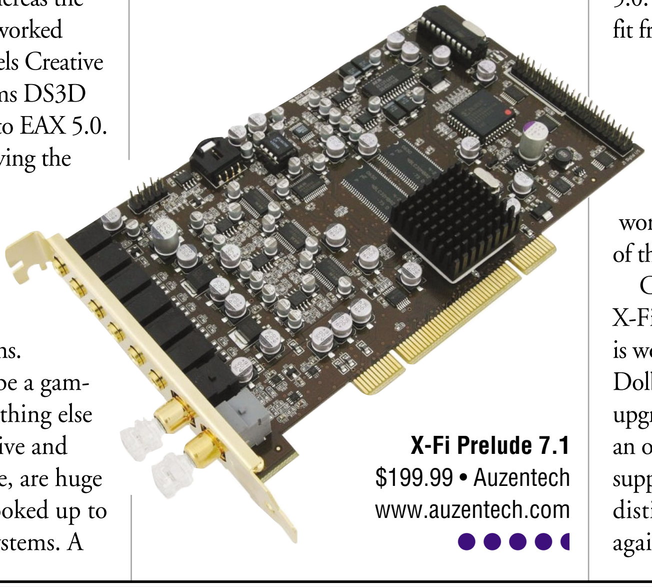
The Xonar D2X might not be a gaming juggernaut, but it did everything else exceedingly well. DTS Interactive and Dolby Digital Live, for example, are huge to the power users with PCs hooked up to meaty, multichannel speaker systems. A bundled MIDI board, ASIO 2.0 driver support, and a suite of OEM software (including PowerDVD 7.0) helped make the Xonar a well-rounded card for the discerning sound quality enthusiast, connectivity buff, and gamer.

## Auzentech X-Fi Prelude 7.1

You know you're an industry veteran if you can remember back to when Canopus sold gaming cards based on 3dfx's Voodoo graphics chip. The company earned its stripes by putting the powerful chipset on its own custom-designed boards, improved by tweaked drivers.

Auzentech takes a similar approach to Creative Labs' X-Fi DSP, reworking the reference board design and achieving a 120dB SNR. The Prelude 7.1 also sports changeable OPAMPs (operational amplifiers, which take the DAC's signal and amplify its analog form) for the front left and right channels, an upgrade path for audiophiles interested in a different sound. A couple of the drop-in replacements even cost more than the card itself. Talk about a serious investment into higher fidelity. And according to AuzenTech's president Stephane Bae, the company is wrapping up development on an HDMI 1.3 extension board to enable audio output through the Prelude's 40-pin header.

Put the Prelude 7.1 next to one of Creative's boards and you'll notice several design differences. For starters, Auzentech topped the EMU20K1 DSP with a passive heatsink and re-oriented the 64MB of X-RAM. And the Prelude sports a larger complement of ports. There's a microphone in, a line in, four analog two-channel outputs, and digital I/O that takes optical or coaxial connectors. Different DACs, different ADCs, and solid-state capacitors further set the Prelude apart from Creative's own X-Fi lineup.



**X-Fi Prelude 7.1**
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●●●●◖

The Prelude's software bundle is incredibly sparse, but we're fine with that. Demos and "light" versions of pricier apps usually end up in the trash bin, anyway. Auzentech made deliberate use of the driver package and software interface native to Creative Labs' own products. Although not as centralized as Asus' Xonar control panel, Creative did a good job of optimizing its software for the task at hand, whether that's entertainment, gaming, or content creation. And of course, AuzenTech adds one important differentiating driver feature: Dolby Digital Live support. The next driver update promises DTS Interactive support, too, for real-time DTS encoding.

No doubt about it, AuzenTech's Prelude 7.1 is most at home in a media center or gaming PC. "But what about Vista's UAA and its effect on the X-Fi's gaming capabilities?" you ask. Good question. Auzentech included Creative Labs' ALchemy software—a wrapper similar to Asus' DS3D GX—which is able to turn EAX commands into OpenAL. Whereas Asus can only officially claim EAX 1.2 and 2.0 support, though, ALchemy is complete through EAX 5.0. Consequently, games that used to benefit from hardware acceleration once again utilize Creative's DSP. ALchemy's list of recognized apps is admittedly small, but you can add EAX-capable titles manually. By no means is ALchemy the most elegant solution, but the workaround does effectively re-enable one of the Prelude's principal selling points.

Compared Creative's own Sound Blaster X-Fi XtremeGamer, AuzenTech's offering is worth the $50 premium. Digital outputs, Dolby Digital Live, higher-quality circuitry, upgradeable OPAMPS, expansion through an onboard header, and DTS Interactive support on the way—the list is really quite distinguished. The race is a little closer against the Xonar D2X though, which already offers DTS Interactive output, plugs into a PCI-E slot, and includes PowerDVD software. Both cards are exceptional. But with ALchemy helping re-enable EAX through calls to OpenAL, AuzenTech's Prelude gets our nod. With this board (and the Creative Labs'), we absolutely noticed a difference in gaming with EAX proper vs. integrated sound or Asus' wrapper.

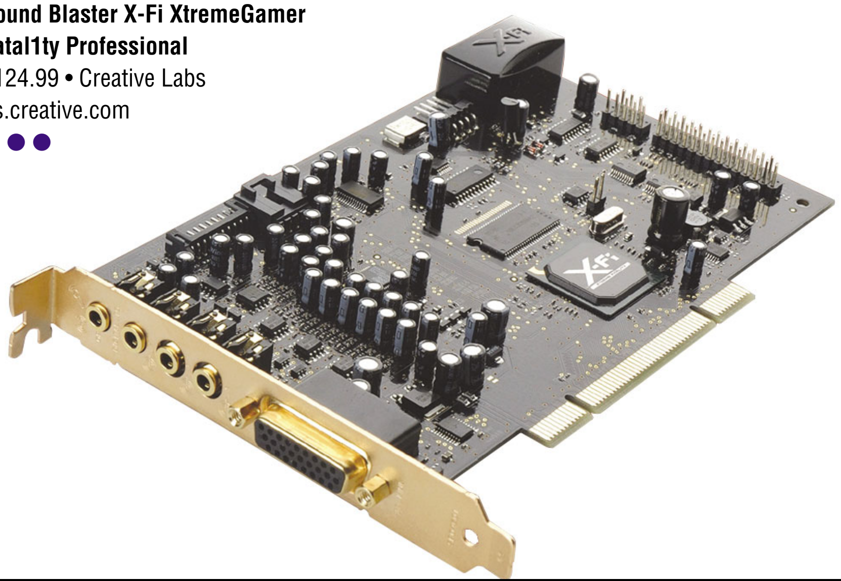
## Creative Labs Sound Blaster X-Fi XtremeGamer Fatal1ty Professional

We know that software issues and legal wrangling have hurt Creative Labs' standing with the enthusiast community. But you can't deny the company's dominance in (and influence over) the sound card market. Its X-Fi lineup is fairly diverse, encompassing the ExpressCard-based Xtreme Audio Notebook to the entry-level Xtreme Audio PCI card to the flagship Elite Pro. The XtremeGamer Fatal1ty Professional series card sits right in the middle of the family, sporting a $125 price tag.

Next to Asus' Xonar and AuzenTech's Prelude, the XtremeGamer's hardware composition isn't as impressive as it once was. Analog outputs support 24-bit resolution and 96KHz sampling, but a 109dB SNR is lower than the other two gaming cards. Of course, it still wields the impressive X-Fi DSP, which gives it hardware-accelerated muscle in games optimized for EAX, and has access to 64MB of onboard X-RAM (even though we still question the benefit of the memory cache).

However, you can tell that this card was the foundation for a more expensive kit. The XtremeGamer's PCI bracket offers four 1/8-inch mini-jacks and an AD_Link port. Three of the jacks offer analog output—two of them include four segments, enabling eight channels. The other is Creative's FlexiJack, which works as a line input and mic input; stereo S/PDIF output and multi-channel passthrough; or Digital I/O module interface. The module is a $15 upgrade that adds optical and coaxial ins and outs. Sitting right below the 1/8-connectors and eating up half of the rear bracket is an AD_Link, used to attach a $180

**Sound Blaster X-Fi XtremeGamer Fatal1ty Professional**
$124.99 • Creative Labs
us.creative.com
●●●



## Our Sound Cards' Sound Specs

| | Asus Xonar D2X | Auzentech Prelude 7.1 | Creative Labs XtremeGamer | M-Audio Fast Track Ultra |
|---|---|---|---|---|
| Bus interface | PCI-E x1 | PCI | PCI | USB 2.0 |
| Analog output | 7.1 (1/8-inch x4) | 7.1 (1/8-inch x4) | 7.1 (1/8-inch x3) | 8 (1/4-inch x6+2) |
| Analog input | 2 (1/8-inch x2) | 2 (1/8-inch x2) | 1 (1/8-inch x1, shared) | 8 (1/4-inch x6+2) |
| Digital input | 1 (coax/optical) | 1 (coax/optical) | 0 | 1 (coax) |
| Digital output | 1 (coax/optical) | 1 (coax/optical) | 1 (stereo or passthrough) | 1 (coax) |
| MIDI I/O | Yes | No | No | Yes |
| Max resolution | 24-bit | 24-bit | 24-bit | 24-bit |
| Max sampling rate | 192KHz | 96KHz | 96KHz | 96KHz |
| **Features** | | | | |
| Dolby Digital Live | Yes | Yes | No | No |
| DTS Interactive | Yes | No | No | No |
| EAX support | 1,2 (3, 4, 5 simulated) | 1, 2, 3, 4, 5 | 1, 2, 3, 4, 5 | No |
| Windows Vista Gaming | DS3D GX 2.0 | ALchemy | ALchemy | No |
| Other | EMI shield, LED lighting, cables included | OPAMP upgrade, 40-pin I/O, solid capacitors | AD_Link port, digital I/O upgrade | 48V Phantom Power, 4 mic inputs, 20dB pads |
| **Performance** | | | | |
| Unreal Tournament 3 (1,600 x 1,200) | 43.13fps | 45.23fps | 44.67fps | 38.03fps |
| MSRP | $199 | $199 | $149 | $449.95 |
| CPUs | ●●●● | ●●●●◖ | ●●● | ●●●◖ |

**CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT**

external I/O console—the same one you'd find in the Elite Pro bundle. We appreciate the flexibility of an upgrade path, but that bracket space could have been put to better use by integrating the Digital I/O Module's functionality instead.

The XtremeGamer's software package consists of Creative's own code, including the easy-to-configure Audio Console, Volume Panel, a THX Console, and the MediaSource library utility, among others. Creative also arms the XtremeGamer with its ALchemy software to revitalize it in Vista.

In its heyday (almost two years ago), the XtremeGamer Fatal1ty Professional was an affordable play on the most powerful audio DSP available. Today, Asus' Xonar D2X and AuzenTech's Prelude 7.1, the latter of which leverages the same engine on a more enthusiast-tweaked board, both showed up the Fatal1ty.

Thankfully for Creative, the recently announced X-Fi Titanium Fatal1ty Pro addresses most of the XtremeGamer's shortcomings.

**Fast Track Ultra Audio Interface**

$449.95 • M-Audio • www.m-audio.com

●●●◖

## M-Audio Fast Track Ultra Audio Interface

If you're into prosumer video production or studio recording, integrated audio is grossly insufficient when it comes to connecting higher-end equipment. Even add-in boards struggle to deliver the right combination of ports for all of your mics, keyboards, headphones, and monitors. So, as Intel's HD Audio standard gains momentum in the mainstream channels, M-Audio is sitting pretty, with a captive audience looking to its specialized audio interfaces for the features sought by professionals.

Why are the M-Audio products referred to as audio interfaces rather than sound cards? Quite simply, a majority of the company's catalog employs either FireWire or USB. Of those that do center on PCI boards, half of them connect to external I/O decks. The Fast Track Ultra is the company's first product able to communicate over USB 2.0, enabling enough bandwidth to record on eight channels simultaneously at 24-bit/96KHz. Hook the box up to a lesser USB 1.1 port and you'll only get two inputs and two outputs capped at 48KHz sampling.

Up front you'll find four XLR microphone inputs, two of which double as XLR/TRS combo jacks for mics or instrument level inputs. All four pre-amps include a 20dB pad to help prevent the distortion of hot signals. Easily accessible knobs let you adjust the gain of those inputs, depending on the device you're working with. M-Audio includes two headphone outputs, each with an adjustable level knob. Indicators up front let you know if the Fast Track Ultra is receiving power, the 48V Phantom Power feature (used to drive professional condenser mics) is on, and the MIDI devices are connected.

Flip the interface around for an even more diverse array of ports and plugs. All six balanced analog inputs and outputs are available back there, as is the S/PDIF digital I/O. One MIDI in and one MIDI out give you the connectivity for a keyboard or DJ software control. Finally, a pair of inserts facilitates outboard processing (think hardware reverb) before the analog signal is converted to digital.

The Fast Track's software bundle is fairly minimalist. M-Audio throws in a copy of Ableton's Live Lite (as you might guess, derived from Ableton Live) to get you started in music production. The only other app is a software control panel used to configure the audio interface from WinXP, Vista, or Mac OS X.

Make no mistake about it; M-Audio's Fast Track Ultra is for audio enthusiasts only. We tooled around in Unreal Tournament 3 for a while and, truth be told, our test mule's onboard HD Audio chip yielded a more believable gaming experience. There's no DVD playback software, nor do you get real-time Dolby Digital encoding. The Fast Track Ultra is a purebred, pro-audio workhorse. If you can put its features to use, you already know that it's in a world apart from the gaming/entertainment cards.

Just remember to bring your own high-end interconnects. Even with that $400+ price tag, the package only includes the Fast Track unit, a USB cable, and a DC power adapter. For what it's worth, we did all of our testing using a Cardas Headphone cable with Sennheiser's HD600, and the combination sounded fabulous.

## Coming Soon: Sound Blaster X-Fi Titanium Fatal1ty Pro

Creative recently announced another X-Fi-based card, the Titanium Fatal1ty Pro, which it hopes will battle Asus' and AuzenTech's flagships at a more affordable price.

The Titanium looks different than its predecessors from every angle. There's a PCI-E x1 interface that appears to be native, an all-black EMI shield covering the onboard circuitry, and a revamped I/O bracket. Gone—thankfully—is the AD_Link connector. Instead, you get one microphone input, four 1/8-inch jacks for analog 7.1 output, and an optical I/O. Like AuzenTech's Prelude, there's also a header for attaching HD Audio-compatible front panel ports.

The Titanium includes support for Dolby Digital Live real-time encoding, one of the Xonar's top selling points. Although Creative couldn't get the card to us in time for a review, it should be available by the time you read this. ▲

**by Chris Angelini**

**CPU RANKING** ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

# Robocop Or Keystone Cop

## Are Consumer-Grade UTMs Worth It?

Running security software can be a total drag, especially on a fast computer that you're trying to keep fast for gaming or a slower machine that just doesn't have the horsepower for the latest and greatest security suite. Maybe a better way would be some sort of "super router"; something that could inspect every packet that went through it on the way to your computer, checking for viruses and spyware; performing typical firewall duties; and, since we're dreaming, look for spam and phishing scams. With such an appliance, perhaps we could do away with a whole bunch of utilities, and as a bonus, protect all the computers on the LAN at once.

Of course, such devices do exist, and they're generically called UTMs (Unified Threat Management). Odds are the corporate LAN you use at the office is protected by a UTM, and enterprise-grade UTMs are designed to work with hundreds or thousands of users and can cost many thousands of dollars.

As is normally the case with technology, as time has passed, UTMs have started to filter down to "consumer-grade" levels, capable of handling the needs of around 10 users or less, with prices usually well below $1,000. Though usually expensive compared to a standard hardware router/firewall, the price seems more reasonable if they allow you to do away with security software licenses. If 10 computers don't need $60 security software, that's $600 saved, plus there's the convenience of only managing the security of one device instead of 10.

To see if consumer-grade UTMs can replace (or at least supplement) antivirus, antispyware, firewall, spam-filtering, and antiphishing software utilities, we rounded up four devices: two from companies that make lots of consumer-grade networking hardware (Zyxel and D-Link) and two from companies that normally make enterprise-grade networking hardware but are starting to branch out to the small office and home power user markets (SonicWall and Check Point). And then we tested the heck out of them.

### How We Tested

UTMs can do a lot more than the typical $50 wireless router you're probably using right now. That said, many of these features are holdovers from enterprise-grade hardware, so we merely noted their presence, spot-checked them for functionality, and moved on. Ditto for built-in wireless connectivity: We made sure it worked if it was present, but we weren't interested in those features, either. Instead, we focused on the threat management portion of UTMs. We wanted to evaluate their ability to protect the computers behind them from the typical threats computer users face: viruses, spyware, spam filtering, and phishing scams. We asked several vendors for equipment that would protect users against these specific threats and then checked out the hardware they sent us. In other words, these are the appliances the vendors thought most appropriate based on our criteria.

For testing against viruses and spyware, we loaded up a Web server on the wide-open Internet with a collection of viruses and spyware ranging in ages from 2003 to the most current versions of the Storm Worm installer, both in straight EXE files and stored within unencrypted ZIP files. Then, we tried to download them with Internet Explorer from a computer connected to the UTM devices. We also emailed ourselves these same viruses and let Thunderbird try to download them. On top of this, we also hit about a dozen sites with different drive-by downloads, using IE6 on a system close to two years behind in its patches but with Norton AntiVirus 2008 installed, since the latter's detection and blocking of drive-by downloads is the best we've tested.

**Safe@Office 500W**
$449/$179 (hardware/annual subscription)
Check Point • www.checkpoint.com
●●●

We also saved up about a week's worth of obvious spam, telling our server to save it instead of deleting it as usual, and checked to see what our UTMs would let Thunderbird download. To assess our devices' antiphishing capabilities, we tried to visit about a dozen obvious phishing scam links to sites claiming to be eBay, CitiBank, and others. We also ran speed tests on our 6Mbps DSL line through the appliances, checking to see if all the packet checking reduced speeds. (To save you the suspense, none of them slowed down the connection.) We cranked up all the appliances' protection features to the max, which enabled those that weren't turned on by default.

### Check Point Safe@Office 500W

Check Point's bright orange-and-yellow appliance is sure to stand out on your

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

**TZ180**
$549/$210 • SonicWall • www.sonicwall.com
●●●

desk, but with ports on the back and status lights on the front, it should physically fit in a stack of home-networking equipment nicely, just like all the units we tested (except the Zyxel). And because it comes with 802.11g wireless abilities, you shouldn't tuck it away in a closet if you want maximum wireless range.

Like all the units except the D-Link, the Safe@Office's security software is built into the unit's firmware, which automatically downloads updates on a regular schedule. Also, like all of the units, it fared relatively poorly at blocking downloadable viruses, blocking only two: a Bagle.BL stored as an EXE and a zipped-up Mytob variant from late 2005. Still, it did much better blocking emailed viruses, stopping about 60% of them—zipped or not—from showing up in our inboxes. Disappointingly, its method of clearing out emailed viruses was simply to block the message entirely, meaning we didn't see the text of the infected message and weren't notified that the blocking took place. We'd rather see some notification. It only stopped one drive-by download, but that was one better than any of the firmware-based, packet-inspecting appliances. It did nothing to stop spam or phishing schemes, but to be fair, this appliance didn't seem to have any such functionality.

The Safe@Office can be set to automatically block any of the commonly infected email attachment file types (like EXEs, SCRs, BATs, and so forth), so with a little bit of configuring, it can be an effective barrier against infected attachments for the entire network.

Otherwise, the appliance had many sterling qualities. Its browser-based GUI was lightning fast, and the screens were sensibly laid out. It can connect to two different broadband sources and automatically switch to one if the other fails. There's a built-in packet sniffer that scans the entire LAN's traffic, and Web filtering was the easiest to configure: Just check and uncheck those topics (like Guns, Hate Speech, or Drugs) that you don't want specific computers on the LAN to see. CheckPoint maintains the list of filtered sites.

### SonicWall TZ180

The TZ180 packed the most features of our UTMs, which reflects the trickle-down nature of the technology. As such, its browser-based GUI was a little cluttered and occasionally required Deep Thought to accomplish tasks. Mercifully, SonicWall's documentation was the best of the bunch by far and included a deeply detailed troubleshooting section. Half a dozen wizards help setting up the basics (configuring Wi-Fi, clearing ports for public-facing server, setting up a VPN, etc.), but the wizards themselves are buried in the GUI.

SonicWall's antivirus and antispyware protection for Web surfers was meager at best, only blocking the same Mytob.LA worm as the Safe@Office 500W, but only when it was zipped. Drive-by downloads went completely untouched, going through easily. Similarly, the very same detection engine did a poor job detecting infected email attachments (catching only Mytob again), but the default setting is to block EXE and VBS attachments right out of the box (which we temporarily disabled to test the AV scanner), so all the EXEs were eventually stopped. You can easily add other commonly infected attachments. The TZ180 thoughtfully added messages to our infected emails explaining what happened, which was a nice touch. Another nice touch was a listing of what malware the TZ180 blocks with its current definition file; there were lots of current nasties in the list, perhaps reflecting an attempt to focus on newer threats than older ones. Given the limits of on-the-fly scanning technology, this may be a fair trade-off, but it still leaves your networked computers vulnerable. Content filtering is based on the administrator (that is, you) entering URLs and IP addresses rather than selecting topics and letting the UTM decide what's acceptable.

When we did let a worm take hold of our system, the TZ180 did a good job of blocking the worm's communication to its networked friends on the Internet. On the other hand, we had to change the default TCP/IP port setting from just "Close" to "Stealth" in order to better confound port scanners. As with the Check Point appliance, there's no antispam or antiphishing protection functions.

### Zyxel ZyWall USG 100

The ZyWall appliance was the only unit that lacked built-in Wi-Fi, and both its ports and status lights are on the front, making it best-suited for use in a rack or wiring closet (it's the only unit that comes with rackmount hardware). That said, you can dedicate one of its Ethernet ports to a relatively inexpensive WAP of your choice, and the ZyWALL knows what to do with it.

Like the SonicWall and Check Point UTMs, the ZyWall can connect to two different Ethernet-based broadband connections. It can perform load balancing (if desired) and automatically switch to one connection if the other drops out. Unique to the ZyWall are USB and PCMCIA slots that let you connect a 3G access point as a backup connection. Only a few 3G adapters are compatible at this point (Zyxel lists the Sierra Wireless AC850/AC860 and Huawei E220 as compatible products), but the switch-over is automatic. (That's what Zyxel tells us; we didn't have the hardware to test the claim ourselves.)

**ZyWall USG 100**
$649/$1,620 • Zyxel • us.zyxel.com
●●

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Malware detection was generally poor. At one point, it detected and blocked two viruses (again, Mytob and Bagle), but one automatic definition update later and Bagle was getting through. The USG 100 didn't block any infected email, and there wasn't a way to block commonly infected file types as attachments, either. The device does include an antispam filter, but it was primitive at best: It blocked or tagged emails coming from blacklisted servers and permitted messages from whitelisted servers, but it's up to the administrator to keep track of those servers and add them manually. You can also enable the checking of various online DNSBLs (DNS block lists), but in our experience this is a heavy-handed measure that can block a lot of nonspam. There were no filters to block phishing scams.

Content filtering was relatively easy to set up, with checkboxes of categories available to block, although the list (15 categories) wasn't nearly as extensive and granular (15 categories) as Check Point's (50 categories). The browser-based GUI was well-organized but terribly slow to display, making exploring of all the ZyWall's features a little tedious.

## D-Link DIR-625

The DIR-625 is slightly smaller and feels significantly lighter than its companions here, and we know why: The bulk of its UTM security features don't live inside a set of chips inside the appliance. Instead, the relatively low-cost UTM offloads nonfirewall responsibilities to a Windows-only software package called SecureSpot, which is powered by McAfee. When the DIR-625 detects a client machine it's never seen before, it sends a prompt to you to download and install SecureSpot. You can then manage SecureSpot through a Web GUI you arrive at either through a Taskbar Tray icon or from the appliance's own browser GUI. Once set up, an administrator can manage all the security settings from one location and password-protect the settings on client computers, if desired.

SecureSpot's anti-malware abilities were superior to its competition, blocking Newbot, Bender 1363, and Wolf B from downloading, but it let us download everything else. It also let through every emailed virus we threw at it. Norton AntiVirus 2008, Eset's NOD32, and even the free AVG 8 all blocked our entire test suite of malware from downloads via Web sites and email both, so it seems SecureSpot needs a little more work in this department. Spam control was rudimentary: Admins can whitelist and blacklist domains, and flagged emails get "SPAM" inserted into the headers, leaving it to you to filter it with your email client. Antiphishing is also basic. SecureSpot kept track of our trusted information and only let us type it into trusted sites that we ourselves defined. Parental controls were perhaps the best here, listing 80 different categories of objectionable sites, and it even had preset settings for different age groups.

The DIR-625 certainly represents a good value, offering protection for up to 10 users from a centralized location for just $60 a year, but the problem is that there's much better malware protection available at the "free" price point if you're willing to administer each machine individually.

**DIR-625**
$104.99/$60 • D-Link • www.dlink.com
●●●

## The Future Is Not Quite Now

There's no doubt that any of these devices has more power and "smarts" than a typical SOHO router, and each offered flexibility that will put a smile on any power user's face. That said, our goal here was to see if any of the new breed of low-cost UTM appliances really offers significantly more protection against malware, spam, and phishing scams than SoHo routers, perhaps to the point where we could ditch our computers' anti-malware software. Clearly, the answer at this time is "No." You simply can't rely on solid malware protection with hardware alone. As the technology gets better and filters down to this price point, we're sure UTMs will get better. We intend to check up on them in the future. ▲

**by Warren Ernst**

## UTM Specs At A Glance

| | D-Link DIR-625 | Zyxel ZyWall USG 100 | SonicWall TZ180 | CheckPoint Safe@Office 500W |
|---|---|---|---|---|
| Wireless | 802.11n | None | 802.11g | 802.11g |
| WAN Ports | 1 | 2 | 2 | 2 |
| LAN Ports | 4 | 5 | 5 | 4 |
| Switchover/Load balancing | N/A | Y | Y | Y |
| Backup Internet connection | None | 3G Wireless, USB, PCMCIA | None | Serial modem |
| Malware protection | Y | Y | Y | Y |
| Spam filtering | Y | Y | N | N |
| Phishing filter | Y | Y | N | N |
| Content filtering | Y | Y | Y | Y |
| VPN | Y | Y | Y | Y |
| Pop-Up blocker | Y | N | N | N |
| Price (hardware) | $104.99 | $649 | $549 | $449 |
| Price (subscription) | $60 | $1,620 | $210 | $179 |
| CPUs | ●●● | ●● | ●●● | ●●● |

**CPU RANKING** ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

# Lite-On DH-401S

**DH-401S**
$149
Lite-On
www.liteonit.com
●●●◖

If you're willing to dot "i"s and cross "t"s to wring a decent BD movie playback experience out of a PC, this SATA BD-ROM might be your ticket. BD-ROMs are primarily movie devices, as it's too early for software distribution via BD; that is, assuming that Blu-ray ever gains traction as an application distribution medium in a world of Internet downloads and cheap DVDs.

Lite-On seems to be fighting just a little harder than Sony to bring down the cost of BD hardware, and it shows in this drive's relatively low price. The DH-401S has a very Sony-like retail bundle, which includes a silver replacement bezel, a tray opening tool, a SATA cable, mounting screws, and a 2-channel, BD-capable version of PowerDVD 7.3.

Aesthetically, the drive dares to be different. It has a square eject button and a crosshatch pattern that covers two-thirds of its faceplate. Some users may be put off by the bold, blue LED glow, especially in a home theater setting. If this includes you, simply pop off the DH-401S's fascia and put a dot of electrical tape over the LED.

This Lite-On edged out Sony's 2X BDU-X10S in most of our tests, as well as in price. The DH-401S's CD ripping time was hurt by the fact that the drive took a long time over the outer tracks, which, to be fair, had a bit of circumferential scuffing. We benchmarked the drive as shipped, although DVD-RAM users may wish to download a firmware update that enables reading of that format. ▲

**by Marty Sems**

## BD-ROM Battle

(1X BD = 4.5MBps; min:sec; Nero DiscSpeed 4.11.2.0 [Lite-On], Nero CD-DVD Speed 4.7.7.15 [Sony])

| | 8.2GB DVD Rip (ISO) | CD Rip (58m, 128kbps WMA) | Read, avg/max | Access time, random/full (ms) |
|---|---|---|---|---|
| Lite-On DH-401S (CP54) | 15:52 | 4:38 (WMP11) | 3.08X/4.05X BD;<br>7.85X/8.23X DVD | 99/278 BD;<br>120/207 DVD |
| Sony BDU-X10S (1.0a) | 17:32 | 3:40 (WMP11) | 1.99X/1.99X BD;<br>5.92X/7.9X DVD | 132/250 BD;<br>130/208 DVD |

**Specs**: SATA; Read rates: 4X BD, 12X DVD, 8X DVD DL, 32X CD; 8MB cache; 7.6 inches deep; One-year warranty

# Iomega REV 120GB USB

Iomega has secured an SMB backup niche with its cartridge-based REV storage device, which the company touts as speedy, cost-effective, and highly reliable. A REV cartridge contains a spindle motor and platter like a hard drive's, but the read/write head and controlling electronics reside in the drive. The rugged media is compact, write-protectable, and easy to store offsite. It also can retain data for approximately 30 years, the company says.

The drag-and-drop, random-accessible REV gets a boost from 70GB to 120GB of native capacity (240GB with compression), mostly due to a switch to perpendicular recording. The new drive can read 70GB REV cartridges but can't write to them, and it can't use the original 35GB cartridges at all.

EMC Retrospect Express 7.5.370 covers the disaster recovery, file copying, and backup bases with encryption, compression, and simple password options. The REV also enjoys support from other third-party backup apps, Iomega says, mentioning Symantec Backup Exec, CA ArcServe BrightStor, and Yosemite Tapeware.

Our eval unit's USB 2.0 interface apparently didn't pose much of a performance bottleneck because the REV 120GB is only rated at a 35MBps maximum transfer speed. The chipper USB REV backed up a 35GB system in 1:23:32 (hr:min:sec) using Retrospect Express' 7.5.11.100 hotfix, or at roughly 420MB per minute (7MBps).

Iomega also sells an internal SATA version for $479.99. An ATAPI/IDE model should surface this year, but eSATA support will wait until that newer interface's popularity grows. REV 120GB disks cost $74.99 each ($65 in five-packs).

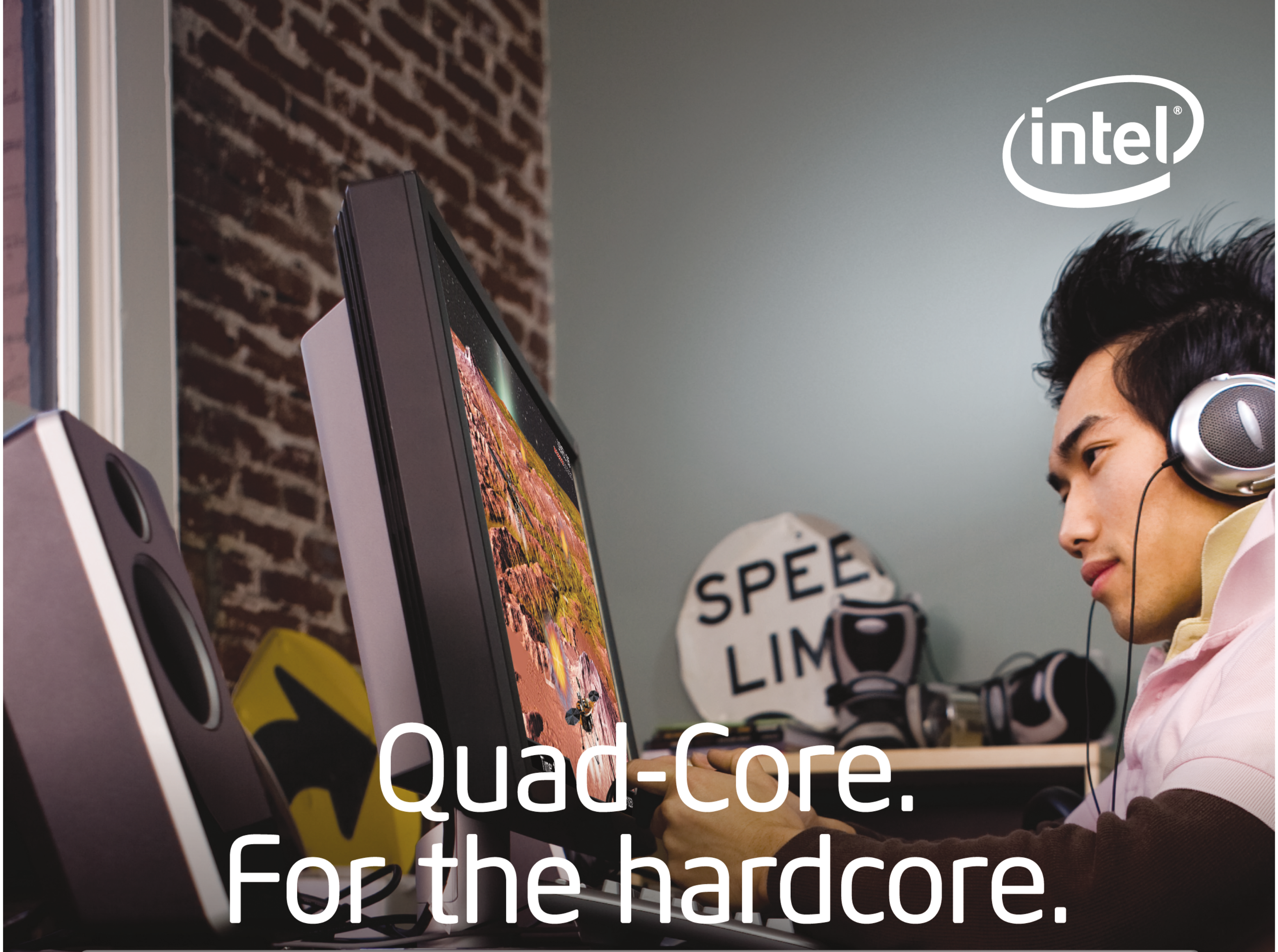
Removable cartridges based on 2.5-inch hard drives are the REV's closest competitive cousins. These include Imation's RDX and Odyssey lines, which respectively range up to 300GB and 250GB. Such cartridges can benefit from every capacity advance by hard drive manufacturers, and these Imation examples are rated to survive greater physical shocks than the REV's cartridges. Still, the Imation cartridges cost three to five times as much as the REV 120GB for the same capacity. ▲

**by Marty Sems**

**REV 120GB USB 2.0**
$499.99 with one 120GB cartridge
Iomega
www.iomega.com
●●●●

**Specs**: 400G cartridge shock tolerance (2ms); Windows 2000/XP/Vista, Mac OS X 10.4 and later; One-year warranty (drive), five-year warranty (cartridges)

**CPU RANKING** ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**


SPEE
LIM
Quad-Core.
For the hardcore.

VIGOR

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intel Core™2 Extreme inside™

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# Dell XPS M7130

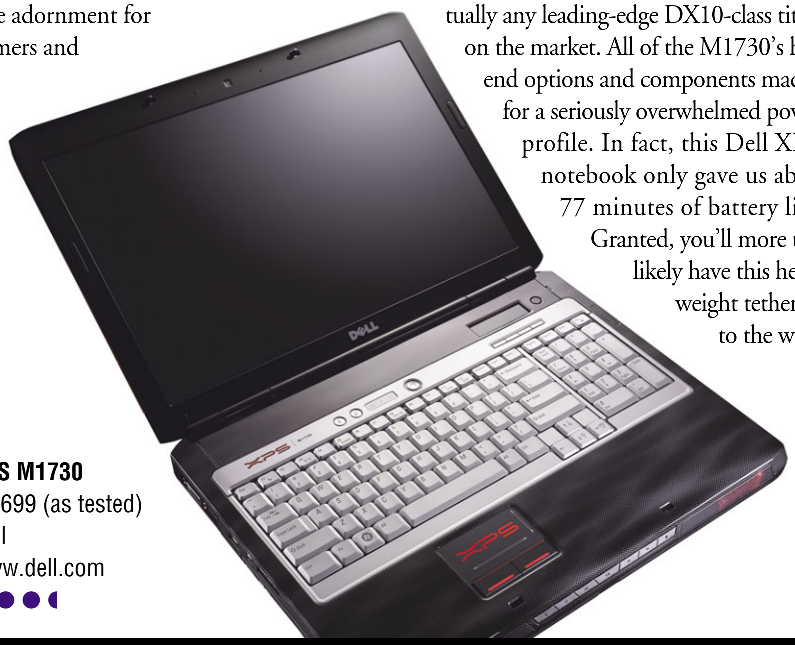
You'd almost never know that Dell was in the process of expanding its focus (and R&D cash) on making Alienware its premier gaming line. The XPS line won't be vanishing as a high-end gaming line, but it's clear which brand is the top dog. However, given Dell's recent releases with its watercooled Killer Gaming Rig desktop XPS 730 H2C system and its flagship XPS M1730 gaming notebook, the latter of which we had the time to run through the wringer, it would seem like it's business as usual for the Dell XPS design team.

The Dell XPS M1730 is an absolute behemoth of a notebook. Weighing in at over 10 pounds, you're not going to be dashing through airport terminals with this bad boy. The design and build quality of the XPS M1730 was fairly cutting-edge with sturdiness that is second to none. However, the system's glossy finish, though carefully masked by its black and gray, almost Kevlar-style paint job, showed fingerprints and smudges quite easily. What's perhaps its most impressive adornment for gamers and enthusiasts is the system's tricked-out lighting system. Like previous M1700 series notebooks, the M7130 is laced internally with LED lighting that can be controlled via the BIOS and produce dozens of colors to light up the keyboard, touchpad, and cover panels. The M1730's LCD panel is a 17-inch widescreen with a native resolution of 1,920 x 1,200. In testing, the screen was crisp and ghost-free under intense action gaming or viewing digital video content. It did lack a bit of flexibility when scaling to lower resolutions, which caused the image quality to blur prominently. However, make no mistake; the XPS M1730 is a visually impressive notebook with a high "wow" coefficient.

Beyond the beauty, there is also brawn under the hood of the new XPS M1730. We tested a system outfitted with a 2.8GHz Intel Core 2 Extreme Mobile X9000 processor. In terms of the graphics processing, our configuration came with a pair of Nvidia GeForce 8800M GTXes in SLI, which is more than enough juice to play virtually any leading-edge DX10-class title on the market. All of the M1730's high-end options and components made for a seriously overwhelmed power profile. In fact, this Dell XPS notebook only gave us about 77 minutes of battery life. Granted, you'll more than likely have this heavyweight tethered to the wall, but even for a desktop replacement, battery life was just plain limp.

Conversely, the new XPS M1730, with its powerful arsenal of the latest Intel CPU and Nvidia GPU technologies at hand, turned out some of the best performance numbers we've seen to date in a gaming or desktop replacement. If you want one of the biggest, baddest, 17-inch gaming notebooks around, the Dell XPS M1730 will pull pink slips for you on the performance track. And it will do it in cruiser style on the strip with lights, spinners, and a factory pimped-out look that is sure to turn heads. ▲

**by David Altavilla**



**XPS M1730**
$3,699 (as tested)
Dell
www.dell.com
●●●◖

Specs: 2.8GHz Intel Core 2 Extreme Mobile X9000, Intel G965 chipset, GeForce 8800M GTX (SLI), 250GB Seagate Momentus 5400.4 HD, 4GB DDR2 667 Memory, Windows Vista Professional

## Benchmark Numbers

| | |
|---|---|
| **3Mark06** | |
| Overall | 12554 |
| CPU test | 2449 |
| **Crysis CPU Test** | |
| 800 x 600, no AA | 124.49 |
| **F.E.A.R CPU Test** | |
| 800 x 600, no AA | 235 |
| **Call of Duty DX10** | |
| 1,280 x 1,024, No AA | 93.7 |
| 1,680 x 1,050, No AA | 67.3 |
| 1,680 x 1,050, 4XAA | 47.7 |
| **Cinebench 10** | |
| Multithreaded | 5893 |
| Single-threaded | 3070 |
| **PCMark Vantage** | |
| Overall | 3804 |
| Memories | 3165 |
| TV And Movies | 2580 |
| Gaming | 3826 |
| Music | 3696 |
| Communications | 3391 |
| Productivity | 3328 |
| HDD | 2724 |

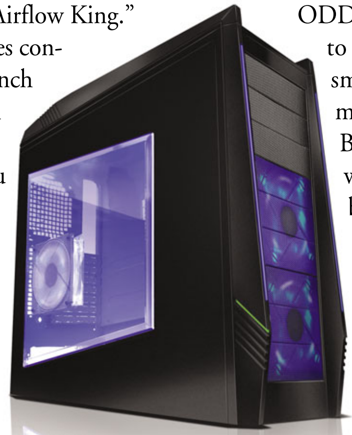
**CPU RANKING** ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

# NZXT Tempest

Smooth simplicity is what makes the NZXT Tempest a striking chassis. The steel midtower is black, with mesh covering the front and top panels. The removable side panel sports an acrylic window, where a blue LED fan illuminates the system's components. On the front of the top panel are two USB ports, an eSATA port, audio jacks, and the power and reset buttons.

The Tempest lives up to its name with two 120mm fans on the top panel and one side-panel 120mm LED fan that cools internal components. Another 120mm fan resides in the rear, and two 140mm fans hang on the top panel. Despite the windstorm inside the chassis, the Tempest ran quietly.

Inside, the Tempest had plenty of room, even for an eATX motherboard and 10.5-inch graphics card. The PSU bay is located in the bottom rear of the chassis, helping to maintain lateral airflow and live up to the name "Airflow King."



There are two drive cages containing eight internal 3.5-inch HDD bays. Three external 5.25-inch bays are available, plus three more if you remove one of the HDD cages. There's also an adapter to add a 3.5-inch floppy drive in one of the 5.25-inch bays. All of the bays are tool-less, but the 5.25-inch bays may as well not be. Don't be surprised by the screw-like pegs that lock the drives in. They are pictured differently in the users manual and don't hold the drives securely. To properly hold the drives in place, you have to unscrew the opposite side panel, fish out the included ODD screws, and fasten them to the drive through the small holes in the nonremovable motherboard tray. By doing this, you may as well forgo the tool-less brackets altogether.

Despite tool-less inconsistencies, NZXT's Tempest is a durable, stylish, and enthusiast-friendly case that is sure to please. ▲

**by Kris Glaser**

**Specs:** Bays: 3+3 5.25-inch external (1 3.5-inch external via adapter), 8 3.5-inch internal; Motherboard support: mATX, ATX, eATX; Fans: 4 120mm, 2 140mm

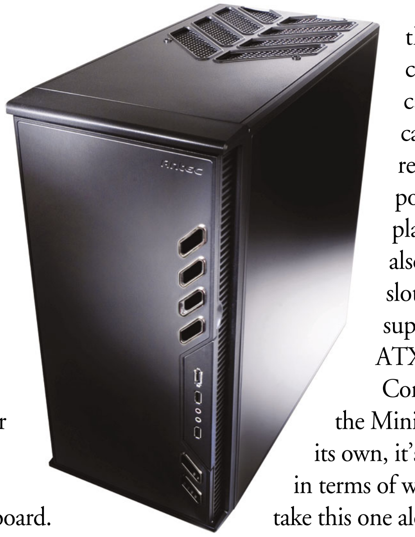
**Tempest**
$109.99
NZXT
www.nxzt.com
●●●◖

# Antec Mini P180

If you call yourself a quiet-computing enthusiast, then silence is truly golden to your ears. But that rule isn't the only standard that should determine which case you'll buy next. We evaluated the cool and quiet Antec Mini P180 and found that this small, portable enclosure doesn't compromise noise management for sleek design.

The Mini P180 boasts a dual-chamber structure that isolates the power supply from the rest the PC components, which reduces system noise. Silicone grommets embedded in the removable chassis kept vibrations to a minimum. Additionally, three-layer side panels muffled any superfluous sounds.

Space became an issue during assembly: The Mini P180's 200mm top fan didn't leave enough room for us to install our LG Super Multi Blue Blu-ray/HD-DVD drive in the case's top 5.25-inch bay, so we had to move it to the 5.25-inch bay at the bottom of the case. This created another problem: Our PSU barely had enough room to coexist with the optical drive in the bottom chamber. 1kW+ PSUs are out of the question for this case. We also had to remove the rear exhaust fan to install our motherboard.



The interior was in no way lacking builder-friendly features, though. The tool-less drive bay screws allowed for hassle-free drive installation. If you're concerned about proper airflow or aesthetic appeal of the inside, you can conveniently bundle cables alongside the case, separated from the rest of the interior components by a durable plastic panel. There are also four rear expansion slots, and the chassis can support up to a micro-ATX motherboard.

Compared to larger cases, the Mini P180 is petite; yet, on its own, it's no runt of the pack in terms of weight. So, when you take this one along to the next LAN party, don't underestimate its heft. ▲

**by Joanna Safford**

**Specs:** Drive Bays: 3 5.25-inch external, 5 3.5-inch internal, 1 3.5-inch external; Cooling System: 1 rear fan (120mm), 1 top fan (200mm), exterior speed control switches; Design: three-layer side panel, cable organization; Front Ports: 2 USB, 1 eSATA, Audio I/O

**Antec Mini P180**
$159
Antec
www.antec.com
●●●◖

**CPU RANKING** ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

# Lenovo ThinkPad X300

The lack of creature comforts, such as a full-sized keyboard and a DVD writer, has limited the functionality of many "lightweight" notebooks. Weighing in at 3.37 pounds (as tested), the Lenovo ThinkPad X300 is a lightweight that doesn't skimp on productivity tools. The build Lenovo sent us included all the features mentioned above, as well as 802.11a/g/n, Bluetooth, GPS, WWAN, three USB ports, a 10/100 Ethernet port, and a Web cam.

The X300 we tested was .92 inch at its thickest, making it slightly thicker than the MacBook Air—not bad if you consider that the X300 offers more built-in connectivity and I/O connections. The X300's battery lasted an impressive three hours during DVD playback, or 4.5 hours for word processing/Internet use.

The low voltage, Intel Core 2 Duo SL7100 helps extend battery life, but the 1.2GHz CPU performed poorly in our system tests, posting a 1008 CPU score in 3DMark06. Additionally, we experienced some lag when opening PDF files and performing basic photo editing. The 64GB storage capacity is large for an SSD drive, but Lenovo doesn't offer other storage options: You're forced to configure the X300 with the expensive SSD drive.

**ThinkPad X300**
$3,600 (as tested)
Lenovo
www.lenovo.com
●●◖

For those who require consistent Internet and file access, the ThinkPad X300 is sure to meet your needs. On the other hand, the laptop's limited processor and graphics power, in combination with its price, restrict the X300's appeal to mobile workers. ▲

**by Nathan Lake**

## Benchmark Results

| | Lenovo ThinkPad X300 |
|---|---|
| **3DMark06** | |
| Overall | 466 |
| SM2.0 | 133 |
| HDR/SM3.0 | 191 |
| CPU | 1008 |
| **Cinebench 10*** | |
| Multithreaded (score) | 2,281 |
| Multithreaded (min:sec) | 6:27 |
| POV-Ray 3.7 Beta** | 273 |
| WinRAR 3.71* | 5:05 |

* minutes:seconds ** pixels per second

**Specs:** CPU: 1.2GHz Intel Core 2 Duo SL7100; Memory: 2GB DDR2-667; Storage: 64GB SSD; GPU: Intel Graphics Media Adapter X3100; OS: Windows Vista Business (32-bit)

# Trendnet TS-S402

If you have a SATA drive (or two) lying around, a barebones NAS enclosure is a great way to utilize those extra drives. The Trendnet TS-S402 supports two SATA drives (up to 1TB a piece), and with integrated UPnP audio/video and iTunes media servers, the TS-S402 provides some streaming and sharing options not available on all NAS devices.

The two-bay enclosure is a little wider than a 3.5-inch drive, and the bottom half of the metal case is perforated to help vent the hot air from the drives. The front and back of the enclosure have plastic covers that felt rather flimsy. In particular, the door bay bent when we opened it, and the power and copy buttons stuck when we pressed them. Despite these build-quality issues, we experienced no problems during our tests.

To install the drives, we just attached the drive brackets, slid in the drives, and plugged in the SATA cables. We preferred this method to models that require you to open and snap the enclosure back together, because it's much easier to hot swap the drives. Trendnet's configuration utility presents a fairly intuitive interface, but some steps, such as setting up the iTunes server, could use further instruction.

The TS-S402 supports a mirrored or striped array (as well as JBOD). Using RAID 0 over our Gigabit Ethernet router, our 500GB test file transferred at an average of 9MBps. Our 200GB test file transferred at a slightly faster rate of 11MBps. The variety of features on the TS-S402 makes it an attractive option for a barebones NAS enclosure, assuming you don't mind the low-end design. ▲

**by Nathan Lake**

**Specs:** CPU: Marvell 88F5182; Memory: 4MB flash, 32MB SDRAM; Bays: two 3.5-inch SATA HDDs; Ports: Gigabit Ethernet, 2 USB 2.0; hot-swap capability

TS-S402
$224.99
Trendnet
www.trendnet.com
●●●

**CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT**

# The Power of Quad-Core Within Your Reach

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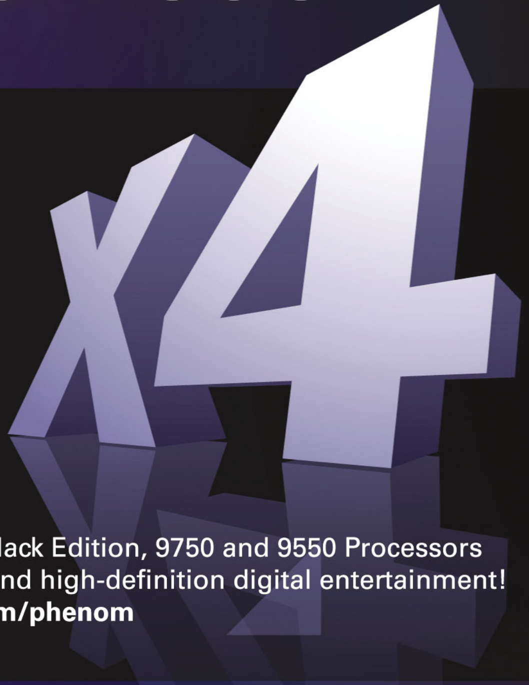

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# Pinnacle Video Transfer

Simplicity. If you value this characteristic above most others when it comes to transferring video to an iPod, then the Video Transfer is a tough act to beat. Just connect an iPod, USB flash drive, notebook, or external hard drive to the VT's USB port and connect the VT to a DVR, TV, DVD player, VCR, camcorder, gaming console, or other video source. Press the VT's Record button and you're moving video straight to the USB-connected device—no PC needed.

The VT lacks a scheduling feature, so you'll need to be around to start and stop recordings, which store as H.264 files at up to 720 x 480. On an iPod, files store in numerical fashion (VID0001.mp4, for example), with no time and date indicated. The VT also supports Sony PSPs. iPod recordings top out at 640 x 480, PSP recordings at 320 x 240, and external drive/flash drive recordings at 720 x 480. Pinnacle gives you an S-Video cable and composite A/V cables for connections. Oddly, a USB Standard-B port is available, but it's reserved for future use and serves no apparent function now.

Operation boils down to making your connections and deciphering LEDs on the unit's top. Blue LEDs indicate Good, Better, or Best settings. A constant red LED indicates you're recording. TV and DVD recordings I made to an iPod nano were impressively sharp in Best mode. Better mode was noticeably fuzzier, although definitely watchable. Flash drive recordings on a PC and notebook were lacking contrast but definitely serviceable. Arguably, the VT's handiest function, however, is how easily it lets you move VHS recordings from a VCR to a PC.

The VT is by no means an end-all cure for transferring video to an iPod, but as a press-it-and-forget-it option, it's a slick option. Video quality isn't going to drop your jaw, but the ease of moving video about without a PC just might. ▲

**Specs:** H.264 files at up to 720 x 480; 38 hours video on 30GB iPod Video in Best mode; 192Kbps stereo audio; S-Video and composite A/V cables included

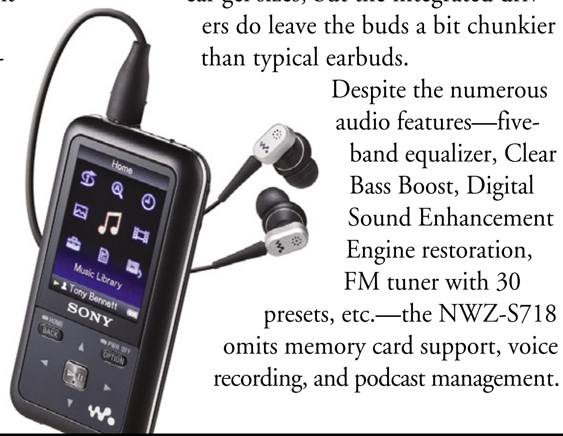
**by Blaine Flamig**

**Video Transfer**
$129.99
Pinnacle
www.pinnaclesys.com
●●●

# Sony Video Walkman NWZ-S718 8GB

I can't imagine you'll watch much video on the NWZ-S718. Despite more-than-respectable clarity, brightness, and lifelike colors, the 240 x 320 screen spans just 1.8 inches, and only MPEG-4 and H.264 files are supported. Pair the EX series noise-cancelling earbuds (13.5mm drivers) Sony bundles with the player's onboard noise-cancelling technology, however, and video may become an afterthought. Even without noise cancellation on, the NWZ-S718's audio quality is about as good as it gets in a portable player.

Sony says the noise-cancellation ability can axe up to 75% of ambient noise. An external switch toggles the feature on and off, and a menu setting controls the preferred degree of cancellation. Despite a very slight trace of white noise, the effect is immediately noticeable and impressive. Keyboard "clacking" and banter from colleagues around me faded nearly completely to black. Whether playing Beethoven, The Mars Volta, or John Coltrane, audio bolted to the forefront with resonating bass, "tinging" high hats, and remarkable acoustic clarity. Live tracks in particular possessed startling realism. Although audio remains terrific without noise cancellation, ambient noise will creep back in, although not distractingly so. Sony supplies three ear gel sizes, but the integrated drivers do leave the buds a bit chunkier than typical earbuds.



Despite the numerous audio features—five-band equalizer, Clear Bass Boost, Digital Sound Enhancement Engine restoration, FM tuner with 30 presets, etc.—the NWZ-S718 omits memory card support, voice recording, and podcast management. Worse, the noise cancellation feature only works with the included EX earbuds, and Sony continues to use a proprietary USB connection vs. standard mini-USB connector. Design-wise, the player is barely business card-sized, and navigation relies on Home/Back and Power/Option buttons, along with a raised Play/Pause button surrounded by four touch-sensitive directional arrows. Though the Home screen is icon-heavy, sub-menus are logically organized, though navigation as a whole lacks some elegance.

Overall, the NWZ-S718's audio quality alone makes it a viable option for those who value superior audio above video and miscellaneous extras. Throw in the fine noise-cancelling implementation, and the player becomes even more enticing. ▲

**Specs:** Audio: MP3, WMA, protected WMA, WAV, unprotected AAC; Image: JPEG; Battery life, hours: 33 (audio), 8 (video)

**by Blaine Flamig**

**NWZ-S718 8GB**
$199.99
Sony
www.sonystyle.com
●●●◖

**CPU RANKING** ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

# TomTom GO 930

GPS devices do a decent job at getting us from point A to point B, but they don't always take the fastest route if you consider traffic, speed limits, school zones, roundabouts, etc. The best way to avoid these delays is with the experience that comes from traveling a route frequently. With TomTom's IQ Routes technology, the GO 930 uses anonymous information collected from millions of TomTom users to calculate the fastest route, taking into consideration these types of obstructions. You can opt in or out of sharing this anonymous statistical data using the TomTom HOME software.

While testing the GO 930 in Houston, the device chose a different route depending on the time of day. Although I'm not terribly familiar with Houston, the GO 930 offered an acceptable route that avoided bumper-to-bumper traffic in many cases. That alone was enough to make me happy.

IQ Routes isn't the only innovation in the GO 930. It also has Advanced Lane Guidance, which displays a graphical view of the lanes of traffic, with an arrow to tell me which lane I need to be in to catch an exit. Another unique feature, TomTom's Map Share, provides up-to-date map information from the TomTom user community. After enabling Map Share, you can select the level of updates you felt comfortable with, ranging from all updates to updates you've made to only those verified by TomTom. If you notice an error while driving, you can press the Report button and enter the details when you're not driving.

As you can see, the GO 930 is packed with features, including an integrated microphone and speaker that let me use the device for hands-free calling with my Bluetooth phone. Using this hardware, I was also able to dictate addresses instead of entering them via the touchscreen. ▲

**by Jennifer Johnson**

**Specs:** 3.3 x 4.7 x 1 inches (HxWxD); 7.75 ounces; 4.3-inch WQVGA widescreen LCD (480 x 272); 4GB flash memory; SD card slot; RDS-TMC traffic-compatible; FM transmitter; Bluetooth; up to five hours operation on lithium-polymer battery; integrated microphone and speaker

**GO 930**
$499.95
TomTom
www.tomtom.com
●●●●

# GE E1235

When you think of GE, you probably think of household appliances, small electronics, or maybe even jet engines. Did you know the company also makes digital cameras? It's true: The company launched its first line of digital cameras in mid-2007.

For just under $200, you can pick up the E1235, a 12.1MP camera complete with face, smile, and blink detection; panorama mode; and more. This camera has a slightly larger footprint than most of today's new ultra-compact digital cameras, but it's still very portable and lightweight.

I was impressed by the E1235's image quality. Some images and automatically exposed pictures looked better than others did, but the overall color accuracy and image quality was acceptable. When shooting with the camera's macro mode, I was very pleased with the fine details and quality of the images, which were taken only a few inches from the subject. The camera supports an ISO of 3200, but pictures taken with this setting were quite noisy.

I was somewhat disappointed with the camera's face- and smile-detection features, though. Although face detection usually found my subjects' faces, I didn't always agree with the exposure settings it chose. Also, the camera required a bit of time to detect a smile and fire the shutter in smile-detection mode. This slight lag could cause you to miss the shot. On the upside, blink detection seemed to work pretty well.

The built-in panorama mode was easy to use. When examining the photos on my computer screen, I could usually tell where the camera stitched the images together, although some panoramic shots turned out remarkably well.

For a budget-friendly and very capable camera, GE did well with this second-generation digicam. Although GE could stand to polish a few features, the camera does a more than adequate job for the average user. ▲

**by Jennifer Johnson**

**Specs:** 12.1MP; about 5.8 ounces with card and battery; 2.2 x 4.1 x 0.9 inches (HxWxD); 2.7-inch LCD; 26MB internal memory; supports SD/SDHC cards up to 4GB; 3X optical zoom; electronic image stabilization; movie mode; seven shooting modes; 12 scene modes; face, smile, and blink detection; red-eye removal

**E1235**
$199.95
GE
www.generalimaging.com
●●●

**CPU RANKING** ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

# Corsair HX1000W

**HX1000W**
$299
Corsair
www.corsairmicro.com
●●●●

In a relatively short period of time, Corsair has made quite a name for itself in the PSU market. Like its memory modules, Corsair's power supply offerings have all seemed to offer a little something extra, whether it's near-silent operation or high efficiency, which has helped distinguish them from the competition. Despite the success of Corsair's power supply business, however, the company chose not to go after those ultra-high-end enthusiasts who craved PSUs with quadruple-digit output ratings. Until now, that is.

Corsair recently introduced a 1kW power supply targeted squarely at power users. The unit's cables are mostly modular, and the abundant supply of included accessory cables feature highly flexible wiring, akin to Ultra's FlexForce cables. These cables were much easier to neatly route through a system than typical, rigid, PSU cabling.

The Corsair HX1000W is built using a true, dual-transformer, dual-rail design (which means the rails don't have to share a transformer) capable of supplying a continuous 40A on each +12V rail. That kind of power output has earned the PSU an SLI certification, and the performance from its quality components has resulted in an 80 Plus certification, as well. A single, dynamically controlled 140mm fan quietly cools the HX1000W until the PSU's output reached 600+W. Even then, the unit was fairly quiet.

We put the Corsair HX1000W to the test on the same monstrous 8-core, multi-GPU rig we've used to torture the power supplies in our last few PSU roundups, and the unit handled the load without issue. With a sustained load over the 750W mark with complete stability, we'd say the Corsair HX1000W is one tough PSU, and certainly worthy of consideration for your next build. ▲

**by Marco Chiappetta**

## Corsair HX1000W

| | |
|---|---|
| Rated continuous (W) | 1,000W |
| 12V Rails | 2 |
| +12V continuous (A) | 40A (per rail) |
| +5V continuous (A) | 30A |
| +3.3V continuous (A) | 30A |
| SLI certified | Yes |
| CrossFire certified | No |
| Max wattage tested | 752W |
| Case temp as tested | 64 C |
| Power factor as tested | 0.99 |
| Efficiency rating (as advertised) | 80%+ |
| Cable side | Motherboard |
| Fan(s) location | Bottom |
| Fan(s) | 1x 140mm |
| PCI-E 8-pin | 4 (2x 8-pin, 2x 6+2-pin) |
| PCI-E 6-pin | 2 |
| Main 12V | 20+4 |
| 8-pin EPS12V | 2 (2x 4 + 4) |
| 4-Pin 12V | 2 |
| SATA | 10 |
| 4-pin peripheral | 10 |
| Floppy | 2 |
| Length (including cable bend) | 7.5 inches |
| Warranty | Five-year |
| Miscellaneous | ATX 12V v2.2, RoHS, EPS 12V v2.91 |

# HIS Radeon HD 3650 IceQ Turbo

**Radeon HD 3650 IceQ Turbo**
$99.99
HIS Digital
www.hisdigital.com
●●◖

HIS Digital has brought us the HIS Radeon HD 3650 IceQ Turbo, a graphics card with a low price and entry-level performance. It's not a bad card, although for serious gamers it's not going to get the job done.

The HIS card is essentially an overclocked version of the stock ATI Radeon HD 3650, and it definitely showed an improvement in performance over the original. In every game benchmark, the IceQ Turbo bested the stock version by about 2fps, give or take. However, because the IceQ Turbo requires a large heatsink to cool its overclocked GPU, it eats up two slots in your case.

The Radeon HD 3650 IceQ Turbo has some solid features, including support for HD up to 1080p, two DVI ports, and a maximum resolution of 2,560 x 1,600. Although it may not be able to handle DX10 gaming, if you have the case space, you may find that the IceQ Turbo is sufficient to play older titles. ▲

**by Seth Colaner**

## HIS Radeon HD 3650 IceQ Turbo

| | |
|---|---|
| **3DMark Vantage** | |
| Overall | E7054 |
| GPU | 6290 |
| CPU | 11,100 |
| **1,280 x 1,024** | |
| **Crysis 1.1** | |
| Medium quality | 25.36 |
| High quality | 12.98 |
| **Company of Heroes (4XAA)** | 13.3 |
| **World in Conflict** | 14 |
| **S.T.A.L.K.E.R.** | 23.827 |
| **1,600 x 1,200** | |
| **Crysis 1.1** | |
| Medium quality | 18.49 |
| High quality | 9.45 |
| **Company of Heroes (4XAA)** | 9.9 |
| **World in Conflict** | 10 |
| **S.T.A.L.K.E.R.** | 18.135 |

*(NOTE: For test rig specs and stock Radeon 3650 benchmark results, go to www.cpumag.com/aug/iceqturbo.)*

**Specs:** GPU: Radeon HD 3650; Core clock: 790MHz; Memory: 512MB (128-bit) GDDR3 (1,789MHz); 120 stream processing units

**CPU RANKING** ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

# Thecus N5200B

Nothing says "I take data centralization seriously" quite like a network storage device. Thecus' N5200B tries to be the segment's Swiss Army knife, and, in many ways, succeeds wonderfully. But be warned: This is no consumer-level media server driven by simple setup wizards. Configuring the appliance's long list of features and overcoming its mediocre documentation takes one part tech smarts, one part trial and error.

At first blush, the N5200B would seem to be a simple NAS, but it can do so much more. It'll work as a standard networked storage device if you want it to. However, it also supports iSCSI SAN, enabling allocated storage space to show up as a local drive on your workstation. Mount up to 50 ISO files as if they were shared CD drives. Turn on the media server and stream music across the house. Or set up an FTP for remote access to the N5200B from anywhere in the world.

The only trouble is configuring all of those features. Thecus includes very little in the way of paper documentation, and the PDF users manual fails to explain how some of the N5200B's capabilities work. Resourceful power users should have little trouble working their way through. For instance, having never set up a SAN before, I was able to allocate 100GB of a RAID 6 array as an iSCSI target and then set up Vista's iSCSI initiator. One formatted partition later and I was backing up music to the new F: drive.

Thecus' hardware is spot-on. The appliance performed incredibly well, too. It shot a 11.4GB folder over its Gigabit Ethernet connection in 7:35 (minutes: seconds) and received the same folder in 5:13. We'd like to see a little more explanation of the underlying technology making the N5200B so powerful, along with a more polished backup app. Overall, though, this is a great device for enthusiasts looking to move data from several workstations to a centralized network repository. ▲

**by Chris Angelini**

**Specs:** 600MHz Intel Celeron M; 256MB DDR memory; RAID support: 0, 1, 5, 6, 10, JBOD; Ports: 2 Gigabit Ethernet, 3 USB ports, 1 eSATA; 5 SATA bays

**N5200B**
$639
Thecus
www.thecus.com
●●●●

# Intel DX48BT2

If you're building a high-end PC today, you're using an Intel processor. Choosing the right motherboard is a much more difficult choice: There are many solid platforms available. Intel alone offers four comparable chipsets (P35, P45, X38, and X48), and Nvidia's 790i is ideal if you want SLI.

Intel's DX48BT2 motherboard centers on the X48 chipset, one of only two platforms with official support for a 1,600MHz FSB and synchronous DDR3 memory frequencies. Some board vendors say that their competing products work with even faster memory speeds, but if you're the type who'd rather run within spec, the DX48BT2 is a safe bet.

That's not to say Intel skimps on features. The board boasts three PCI-E x16 slots, two of which offer a full 16 lanes of PCI-E 2.0 throughput. The DX48BT2 also supports CrossFireX. And remember, any vacant x16 slot can also take x8, x4, and x1 add-in cards.

Intel is no stranger to overclocking anymore, and the DX48BT2's BIOS includes the basic frequency and voltage ranges to optimize the performance of a Core 2 Extreme chip. You can also download the Desktop Control Center software from Intel's Web site if you'd rather tweak straight through Windows. The interface is clean, and the app is remarkably stable for a beta release.

Be careful if you're planning to use multiple graphics cards with the DX48BT2. Longer boards such as our GeForce 8800 GT block at least one SATA port in any of the x16 graphics slots. Use three cards and you're looking at three blocked SATA connectors. If you need the 1,600MHz bus, go for Intel's DX48BT2. Otherwise, the new P45/ICH10 chipset combo is likely a better value. ▲

**by Chris Angelini**

*NOTE: For full benchmark results, go to:*
www.cpumag.com/cpuaug08/DX48BT2

**Test system specs:** 3.2GHz Intel Core 2 Extreme QX9770; 2GB OCZ Technology DDR3-2000; Nvidia GeForce 8800 GT; 1TB Seagate Barracuda 7200.11

**Specs:** Socket 775; Chipset: Intel X48 Express; 1,600MHz FSB; Max memory: 8GB DDR3-1600; Audio: Sigmatel 9274D; Slots: 3 PCI-E x16, 2 PCI; Ports: 8 USB 2.0, 2 eSATA, 1 FireWire, 1 Gigabit Ethernet

**DX48BT2**
$249
Intel
www.intel.com
●●●

**CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT**

by Anand Lal Shimpi

# Apple Takes On . . . Google?

Apple announced the iPhone 3G, and as expected, it adds support for 3G (UMTS/HSDPA) and GPS. There are obviously styling differences: The new phone is available with a glossy black or white back (16GB only). Pricing is also reduced; the 8GB phone will sell for $199 with a two-year AT&T contract, while the 16GB model will sell for $299.

Released a mere 12 months after the original model's introduction, the new iPhone (which will launch worldwide July 11) fails to introduce any of the truly revolutionary features. But honestly, those expectations were nothing short of unreasonable. The iPhone's interface continues to be its main attraction, and by addressing the slow network speeds, Apple will have tweaked the design enough to keep it fresh for another year.

With the new iPhone comes its long-awaited 2.0 firmware that enables the App Store and the ability to run third-party applications developed using the SDK. There are also some tweaks to the OS, enabling things like searching for contacts, and there's promise of an IM client to come this September. Still, there are other deficiencies that remain, such as the inability to cut and paste text.

While iPhone 3G and firmware update announcements were exciting, the most interesting announcement, in my opinion, was Apple's MobileMe. When I first started using a notebook in addition to my desktop, my biggest issue was keeping the two in sync. Back then, wireless Internet and broadband were hardly prevalent, so I mainly needed a good way of keeping documents in sync. But these days, you've got calendars, email, contacts, photos, files, etc. All of them need to be kept up-to-date across multiple computers.

Apple solves this problem by allowing all changes made to your calendar, email, address book, and photo library to be pushed, via the Internet, to all of your devices: Mac, PC, and iPhone. It seems like you have to use an "@me.com" email account to get the synced email, but the concept is very cool. You can even enable a sort of file sharing by storing files you want to share across all devices on a virtual drive that exists online, but with broadband upload speeds capped at what they are, it's still not all that useful for anything beyond document sharing.

MobileMe has a pretty slick online interface, as well. All of the online applications look like the desktop Mac applications. Calendar, Mail, Address Book, and even the photo app all look gorgeous based on what Apple has demonstrated. The only issue is that you have to pay for MobileMe—$99 per year for 20GB of storage.

If any of this sounds familiar, you shouldn't be surprised. Google offers virtually the same services. You can access your mail everywhere using Gmail (and with IMAP enabled, you can have your email synced across all devices). The same goes for Google Docs, Google Calendar, and Picasa. The Google applications don't look as cool, and there aren't any desktop clients for most of them, but the functionality is mostly identical to what MobileMe offers (you can even use your Gmail as a storage device with third-party applications) . . . without the $99 annual fee.

Google's Android, an open mobile OS, is designed to compete with the iPhone OS and Windows Mobile. The applications it will use and sync to are the same ones I mentioned above. Google's apps already exist online, and like Google Maps, many of them have already been ported to mobile phone platforms, so envisioning a mobile phone platform that's designed to use these applications and stay in sync with all of your other devices/systems that use them isn't too far-fetched.

Apple and Google have been playing very well together over the years. Google Maps is an integral part of the iPhone, and Gmail IMAP support gave the iPhone the closest thing to reliable push email that it could have at the time. But these two are very quickly lining up to be real competitors: the iPhone and MobileMe vs. Android and Google Apps. The only thing keeping the competition civil right now is that MobileMe isn't free, but as the line between online and offline applications gets blurry, I wonder how long that will be the case. ▲

*Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in* USA Today, *CBS' "48 Hours," and* Fortune. *His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

**Talk back to Anand at anand@cpumag.com**

# The Shark Tank

by Alex "Sharky" Ross

# Round Two For The Eee PC

Introduced in the summer of 2007, the little Asus Eee PC has been an incredible hit. The ultra- small -form factor, tree-hugging battery life, light weight, and affordability certainly hit the spot. Since the Eee PC's inception, the budget UMPC (ultra mobile PC) market has really taken off and spawned several other similar offerings from the likes of HP. Even the gear heads at SharkWerks all own and use the Eee PC for various tasks. We think of it as a go-between in terms of an iPhone and a real notebook. Quite why we all need to have one of each is a mystery, but I for one can't imagine being without any of those devices for a day.

The original Eee PC wasn't perfect, but it was, after all, a first bite at the cherry. There have since been a few updates and fancy accessories released for the original PC 701 4G. Finally, a year later, Asus has rolled out the new Eee PC 900. From a physical standpoint, the first thing you notice is that the screen has gotten larger. The original sported an 800- pixel-wide-capable 7-inch screen—a little on the wee side—which made for a lot of annoying side-scrolling. The 8.9- inch screen is not only larger but with a higher and more useful 1,024 x 600 resolution. Although the screen is not as bright and true as what you'd find on a much more expensive Sony TZ, it's nonetheless impressive. The keyboard is still as small as ever, but providing you don't have large fingers and two left hands, you should be able to type relatively easily. (I'm writing this column on an Eee PC.). The TouchPad is all new and nifty. Not only is it larger, but much like an iPhone, Asus has multi-touch enabled on it so you can zoom in and out of pictures—- very snazzy, indeed.

Disappointingly, the guts of the Eee PC haven't been given an update. The same Intel 910GML platform is used along with a ULV 900MHz Intel Celeron CPU. This time it's actually clocked at 900MHz instead of the 630MHz found on the Eee PC 700. Even more power would have been nice, but if it keeps the price as- is, then so be it. The Intel UMA integrated graphics, WiFi, 10/100 Ethernet, and audio capabilities all remain identical to the original, also. At least the memory department got a boost in the form of 1GB worth of DDR2-667 RAM, which is double that of the previous version. The ramped- up clock speed of the CPU and more memory has certainly translated into peppier performance. Application load times and boot ups seem quicker, as well. If you are planning to run any "serious" benchmarks, then think again. The PC 900 is no speed demon, so don't expect too much in that department.

Asus has also provisioned more storage for the Eee PC. You can choose between a 20GB model pre-loaded with Xandros-based Linux or a 12GB set up with Windows XP Home. The price for both is $549, and the more expensive OS obviously compensates for the smaller amount of memory. The OS itself lives on the 4GB internal flash memory and is supplemented with more storage modules in the form of 8GB for the Windows setup or 16GB for Linux.

The PC 900 is every bit as good as the original, only it really seems as though Asus has listened, learned, and tweaked a few things to make it even more appealing than it was before. Battery life is still a hair north of three hours, but the overall experience now seems quicker and doesn't feel as though you are "compromising" as much as the first time around. The price has gone up a notch, and there's one more catch. At the time of going to press, Asus announced a 901 version based upon Intel's new Atom processor along with the 945G chipset and ICH7M. The timing of this announcement leaves retailers and prospective Eee PC 900 buyers in a bit of a quandary. Indeed, some vendors have already pulled the PC 900 off of their Web sites, which is a shame. Very strange marketing and timing, indeed. ▲

**Email me at sharky@cpumag.com**

*Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently overclocks/tunes Porsche 996 Turbos with www.sharkwerks.com when he's not tweaking PCs.*

# PC Modder

## Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

## Mods & Ends

### Arctic Cooling Accelero Xtreme

Modders looking for a quick and easy way to quiet a G80-based GeForce 8800 series card, GeForce 9800 GTX, or Radeon HD 2900 series card need look no further. Arctic Cooling now offers a trio of new Accelero Xtreme GPU coolers designed to be a direct replacement for the cards' stock coolers.

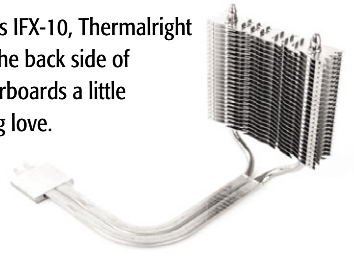
The Arctic Cooling Accelero Xtreme coolers ($54.95; www.arctic-cooling.com) feature three, 80mm PWM (pulse width modulated) fans mounted atop a large, 107-fin heatsink that is intertwined with five copper heatpipes. The cooler's design allows for high air flow through the heatsink, which enhances cooling performance over stock coolers. The patented fan shroud and a low-noise fan impeller eliminate the humming noise produced by some fans.

Arctic Cooling's Accelero Xtreme coolers are also designed to cool the graphics cards' integrated memory and voltage regulators, which should further aid in lowering the overall card temperature, and they come with MX-2 TIM (thermal interface material) pre-applied. It doesn't get much easier than this.

Arctic Cooling's Accelero Xtreme GPU coolers help certain high-end graphics cards run cooler and quieter.

### Thermalright IFX-10

Did you ever feel the need to cool your backside? No, not that backside; get your mind out of the gutter. We're talking about the backside of your motherboard's CPU socket. If so, Thermalright has introduced the IFX-10 Backplate/Motherboard Backside CPU Cooler, which is designed to do just that. The IFX-10 ($32.95; www.thermalright.com) is compatible with all of the products currently offered in Thermalright's existing CPU cooler lineup, in addition to any push-pin type LGA 775 cooler, or AMD Socket AM2+/AM2/939 cooler. It mounts directly beneath the CPU socket to wick heat away from the CPU and PCB from below the motherboard, provided you have got the necessary 70 millimeters of clearance for the IFX-10 to extend above the motherboard's top edge. For even better cooling performance, the IFX-10 can also accommodate an 80mm fan.



With its IFX-10, Thermalright gives the back side of motherboards a little cooling love.

### Vantec NexStar Hard Drive Dock (D100SU)

Vantec has followed Thermaltake's lead and unveiled an external hard drive dock that makes accessing loose hard drives an absolute snap. The Vantec NexStar Hard Drive Dock ($40; www.xoxide.com) is compatible with any standard form-factor 2.5- or 3.5-inch SATA hard drive and connects to a system via USB or eSATA. The device is essentially an external hard drive enclosure, but instead of having to permanently mount a drive within a case, you can simply slide the drive into the dock. The Vantec NexStar is plug-and-play compatible and features blue LED power and hard drive activity lights. Transfer rates are limited to 480Mbps with USB 2.0, but connect the box to a system via eSATA, and any hard drive that's inserted will perform as though it's directly connected to the motherboard.

## Fashionably Fresh Firmware

### Matsushita LF-MB121 (vBD04)

An update for the Matsushita LF-MB121 internal Blu-ray drive adds support for LTH BD-R discs. (A similar update is also available for the Matsushita BD-MLT.)

www.panasonic.com

### ATI TV Wonder Digital Cable Tuner (v1.17.1)

AMD has released a firmware update for the ATI TV Wonder Digital Cable Tuner that resolves the following issues: IP address assignments when multiple tuners are used, cached SI tables, channel tuning, and the network LED status indicator.

ati.amd.com

### Lenovo ThinkPad R6x/T6x/X6x/Z6x HD Update (vFWSH12)

A firmware update for the hard drives used in a number of Lenovo ThinkPad notebooks resolves an issue with Windows Vista that caused the following error message to display during boot up: "2100: Initialization error on HDD0 (Main hard disk drive)."

www.lenovo.com

**by Marco Chiappetta**

# The Soundless Savage

## High-Powered Quiet Computing

Building a quiet PC starts with choosing the right case. The Antec Sonata Designer 500 we used for our build sports a number of features designed to hush unwanted noise and vibrations, such as sound-deadening materials preinstalled on its side and top panels, a quiet PSU, a three-speed cooling fan, and two types of antivibration hard drive mounts.

A few years ago, we built a quiet PC in this very section of *CPU* and dubbed it "Silent But Deadly." (See pages 33 and 31 in the August and September 2005 issues, respectively, of *CPU*.) At the time, we sought fairly powerful hardware for the project but ultimately made a few sacrifices in the name of silence. The notions of performance per watt and power efficiency weren't quite as prevalent back then, so we also had to go to relatively extreme measures to quiet down what turned out to be a fairly high-performing machine, sacrificing some performance in the name of silence.

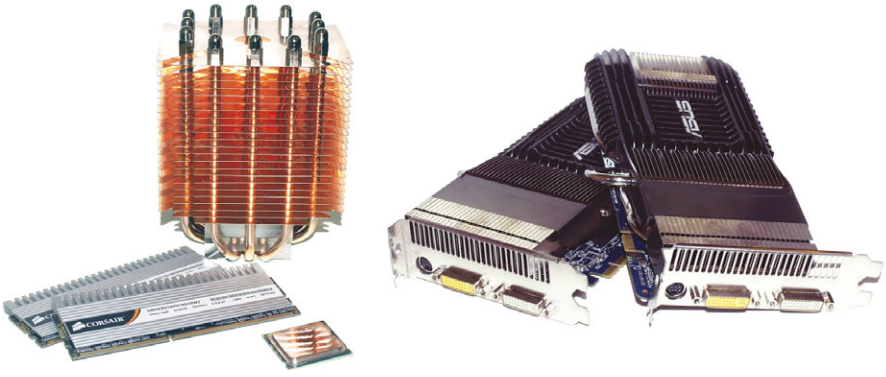
Today, however, power users are much less forgiving. We won't necessarily tolerate excessively loud, high-end hardware just because if may offer increased performance. The market's desire for quieter, more power-efficient, systems has spawned an entire industry segment and vaulted companies such as Zalman, which caters to quiet-computing enthusiasts, to relative prominence. As a result, there are now numerous products designed specifically for quiet-computing applications.

Of course, knowing which components are best-suited to a quiet PC build isn't always easy, especially if said PC also needs to be a high-performance rig. For example, there are a multitude of passive CPU coolers on the market that claim to support "Intel Core 2" processors, but that doesn't necessarily mean they support all Core 2 processors. (Try passively cooling a QX9770 and you'll see what we mean.) And most high-end motherboards sold today are equipped with passive chipset cooling, but they still depend on residual airflow from a nearby CPU fan to keep things operating reliably.

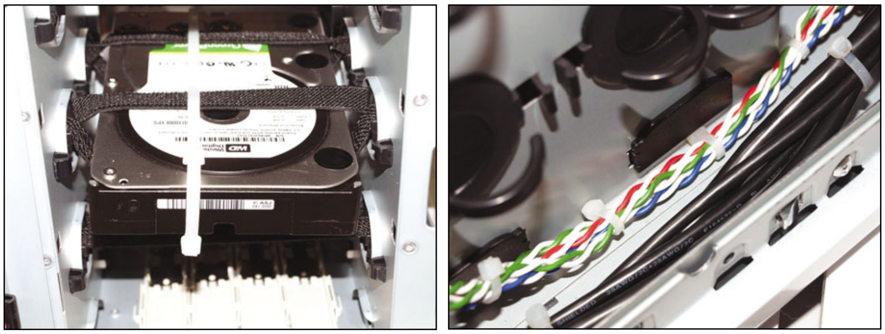
With the myriad of products that are currently targeted at quiet-computing applications, we thought it would be a good time to revisit the idea and build a modern quiet PC loaded with relatively high-end parts. As you'll see, the end result was a powerful system capable of tackling even the most demanding applications. At the same time, it generated such little noise that it was tough to tell if it was even powered up.

### A Shopping Cart Of Quiet

Arguably the most vital aspect of building a quiet, high-performance PC is actually choosing the correct components. Before spending a dime on anything, consider each part individually, as well as how it will fit into your system as a whole. We started our hunt for a case that was designed for silence and wound up selecting the Antec



At the heart of our Soundless Savage lies a Core 2 Duo E8500, Intel's fastest dual-core processor to date. 4GB of Corsair DDR3 RAM, an Evga nForce 790i SLI motherboard, dual Asus EN9600GT Silent graphics cards, and a monstrous Scythe Ninja Copper CPU cooler rounded out the beast's guts.



The Antec Sonata Designer 500's elastic hard drive suspenders didn't hold the drive in place very securely, so we loosely wrapped a few nylon zip ties around the drive to prevent it from sliding out of place.

Sonata Designer 500. We went with this case for a few reasons. First, the case ships from the factory with sound-dampening material already installed on its side and top panels. Secondly, it includes a quiet 120mm exhaust fan with a speed controller switch. It also included a 500W PSU that was both quiet and relatively powerful. And finally, it offers two different types of hard drive mounts, both designed to minimize vibration and noise. We couldn't pass it up.

Choosing the CPU and cooler was relatively painless. We wanted the machine to offer high performance and be great for gaming, so it was definitely going to be a Core 2. Current quad-core Intel processors consume too much power and put off too much heat for this type of build, however, so we opted for the best-performing dual-core processor available, the Core 2 Duo E8500. At 3.16GHz, the E8500 is currently Intel's highest-clocked dual-core processor, and because there's a single CPU die (manufactured using Intel's advanced 45nm process node) under its integrated heat spreader, it has a manageable 65W TDP (thermal design power). And after testing the gigantic Scythe Ninja Copper cooler a few issues back (see page 34 in the July 2008 issue of *CPU*), we knew it would be a perfect fit for this build. The Ninja Copper is built from enough copper and has the heatpipes necessary to handle a heavily overclocked, quad-core processor; our dual-core shouldn't pose a threat, even without using the included fan (at least not in the way Scythe intended; more on that later).

Our choice of RAM and storage was also fairly clear-cut. We wanted 4GB of RAM in the system but didn't want to load up the motherboard and cram four DIMMs next to each other. We also had an idea of what motherboard we'd be using; we'd need DDR3 for it. To that end, we chose a brand new Corsair Dominator kit, the TWIN3X4G1600C9DHXNV G, which consists of a matched pair of 2GB DDR3-1600 sticks, complete with DHX cooling and support for EPP 2.0. For our hard drive, we turned to Western Digital. WD's current line of Green Power drives are both quiet and cool, which makes them well-suited to a build of this type. The 1TB Caviar WD1000FYPS model we chose also offers plenty of space, which is another plus. Lastly, we picked up an inexpensive Pioneer DVD-R that had a SATA interface; the thinner cable would improve air flow, reducing noise.

Finally, we had to choose our graphics cards and motherboard. In terms of overall value and performance per watt, it's difficult to find a better GPU than the GeForce 9600 GT. And after a bit of searching, we came across Asus' EN9600GT Silent, which is equipped with a large passive cooler. A pair of these cards would be a good fit for the build because they'd offer relatively high performance and operate in complete silence, but that meant going with an SLI-capable motherboard, and nForce chipset's aren't exactly known to run very cool. With that in mind, we chose Evga's nForce 790i SLI Ultra and pondered how to keep the chipset cool while minimizing noise.

## Assembling The Beast

Putting together our silent PC was fairly straightforward. We first installed the CPU into the motherboard and mounted the Scythe Ninja Copper cooler. But before doing so, we lapped and polished the CPU's integrated heat spreader and applied some high-quality thermal paste, as we've talked about many times in the past. We inserted the RAM into the appropriate DIMM slots and mounted the motherboard in the case.

Next we mounted the optical drive and moved on to the hard drive. We had two

## The Parts Of Our "Soundless Savage":

We used a variety of readily available components to build our high-performance, nearly silent PC. By choosing the right parts, only a minimal amount of modding was necessary to complete the build. Remember, our goal was to construct a completely stable system that was virtually silent without sacrificing much in terms of overall performance. We selected the following parts:

| | | |
|---|---|---|
| CPU | Intel Core 2 Duo E8500 | $269 |
| Motherboard | Evga nForce 790i SLI Ultra | $349 |
| RAM | Corsair TWIN3X4G1600C9DHXNV G | $689 |
| Graphics | Asus EN9600GT Silent (2x) | $318 |
| Case/PSU | Antec Sonata Designer 500 (PSU included) | $139 |
| CPU vooler | Scythe Ninja Copper | $75 |
| HDD | Western Digital Caviar GP WD1000FYPS | $299 |
| Optical drive | Pioneer 20X DVR-215DBK | $31 |
| **Total** | | **$2,169** |

choices for mounting the hard drive: using trays that were included with the case that feature rubber shocks and grommets or using elastic bands to suspend the hard drive, completely isolating it from the case. We decided to use the elastic bands because it would be the best way to ensure quiet operation, but weren't confident the drive would stay in place if the case was moved. To that end, we wrapped the drive with nylon zip ties to prevent it from slipping too much. We inserted the graphics card before moving on to the cable management.

When building a quiet PC, it is paramount that every cable is neatly bundled and routed as far out of the way of any major components as possible. We bundled the unused cables leading from the PSU and secured them in place with zip ties. (If you want to opt for a modular PSU to minimize cables in your build, we'd recommend a unit from Zalman's ZM series or Corsair's TX series.) We also treated the cables we did use with zip ties every couple of inches, to keep them bound tight. Wherever possible, we routed each bundle around the back of the motherboard tray or drive cage. The end result was a nice, clean build, where air could freely circulate.

To ensure our graphics cards and mobo chipset received adequate cooling, we used the ultra-quiet, 120mm fan that came with the Scythe Ninja Copper. To position the fan where we wanted, we fashioned a custom mount using a pair of expansion slot shields, some double-sided tape, and a bit of black electrical tape, and screwed it to the bottom of the case.

## The End Game

Remember that nForce 790i SLI Ultra motherboard we mentioned earlier? Well, we knew it wouldn't operate reliably without some consistent air circulating over its heatsink's fins. The case's single exhaust fan was only about an inch away from the CPU cooler and didn't move enough air on its own to keep all of our passively cooled components operating at low enough temperatures. To increase the amount of air directed over the chipset and graphics card, we decided to fashion a custom mount for the ultra-quiet, 800rpm, 120mm fan that was included with the Scythe Ninja Copper. We used a pair of expansion slot covers, secured to the side of the fan with double-sided adhesive, reinforced with electrical tape, as mounting arms to position the fan where we wanted—right above the graphics cards and northbridge.

We then secured the custom fan assembly to the bottom of the case using a couple of screws. Luckily, there were already holes in the bottom of the Antec Sonata, so we didn't have to drill any for ourselves.

With the assembly complete, we were then able to install the OS and take the system for a spin. Much to our pleasure, the system turned out to be incredibly silent. It generated so little noise, we could hardly tell it was on. In fact, from about six inches away, our digital sound level meter registered only 44dB, regardless of whether our system was idling or under load. For reference, in a quiet room, the meter registered 42 to 43dB. ▲

**by Marco Chiappetta**

## Silence Is Great, But Can It Run Crysis?

No build would be complete without a fresh set of benchmark scores to see just how well it performed. To that end, we fired up a few popular benchmarks to see how our Soundless Savage fared in the performance department. Windows Vista Ultimate 64-bit SP1 was installed on the system, along with the latest DX10.1 redist. We used Nvidia's ForceWare v175.16 and nForce v9.64 drivers.

As the numbers show, this machine is quite the performer. Our Soundless Savage posted a score of over 5,000 PCMarks and an overall 3DMark06 score of just over 14000, not to mention a somewhat playable 30fps in Crysis with the quality set to high and the resolution cranked up to 1,920 x 1,200.

| | Soundless Savage: Core 2 Duo E8500 w/EN9600GT Silent SLI |
|---|---|
| **SiSoft SANDRA XII SP2 Processor Arithmetic** | |
| Dhrystone ALU | 29,274 |
| Whetstone iSSE3 | 21,328 |
| **Processor Multimedia (itps)** | |
| Integer x8 aEMMX/aSSE | 208,966 |
| Floating Point x8 iSSE2 | 136,236 |
| **Memory Bandwidth (MBps)** | |
| Integer Buffered iSSE2 | 7,700 |
| Floating-Point Buffered iSSE2 | 7,637 |
| **Futuremark PCMark Vantage x64** | |
| Overall | 5472 |
| Memories | 4194 |
| TV And Movies | 3446 |
| Gaming | 5312 |
| Music | 4548 |
| Communications | 5656 |
| Productivity | 5060 |
| HDD | 3817 |
| **Futuremark 3DMark06** | |
| Overall | 14309 |
| CPU | 2936 |
| SM2.0 | 6712 |
| HDR/SM3.0 | 7040 |
| **Crysis** | |
| CPU test (800 x 600, low quality) | 138.65 |
| Graphics test (1,920 x 1,200, high quality) | 30.04 |

# Mad Reader MOD

## Project Phenom

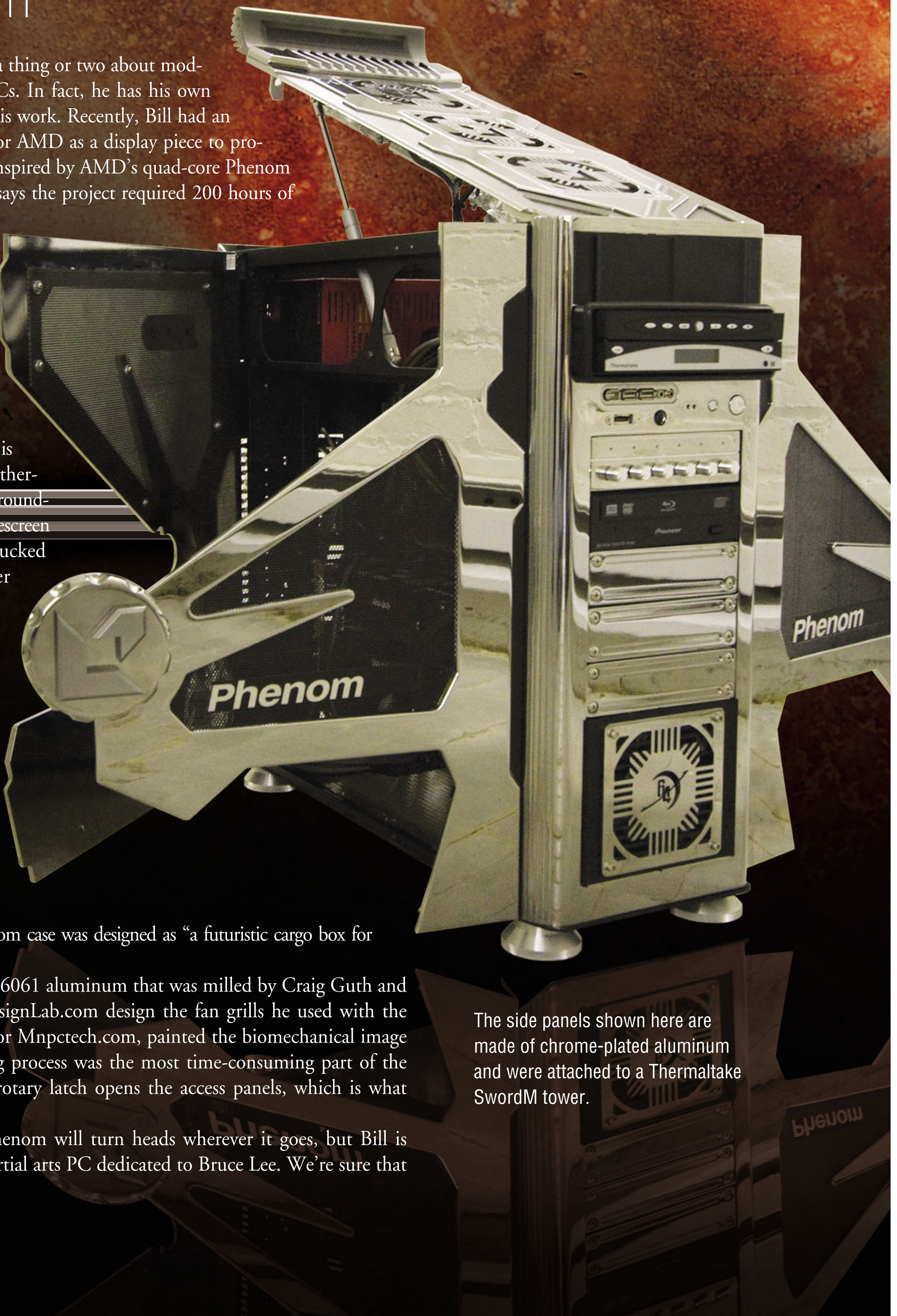
Bill "Overkill Bill" Owen knows a thing or two about modding; he's customized several PCs. In fact, he has his own shop in a warehouse where he does his work. Recently, Bill had an opportunity to create a custom PC for AMD as a display piece to promote AMD's new Spider platform. Inspired by AMD's quad-core Phenom CPU, he jumped at the chance. He says the project required 200 hours of meticulous design and crafting, which culminated in this beautiful Project Phenom mod.

The system includes AMD's Phenom 9900 CPU coupled with a CoolerMaster Copper Sphere CPU cooler, a pair of AMD 3870 X2 video cards, a 400GB Western Digital hard drive, and 2GB of OCZ RAM, all of which is plugged into a Gigabyte 790FX motherboard and a 750W power supply. Bill rounded out the system with a 22-inch widescreen LCD, a Thermaltake LCD screen tucked into a 5.25-inch drive bay, a Razer Lachesis mouse and Lycosa keyboard, and a Pioneer BD drive. The system runs on Microsoft Windows Vista Ultimate.

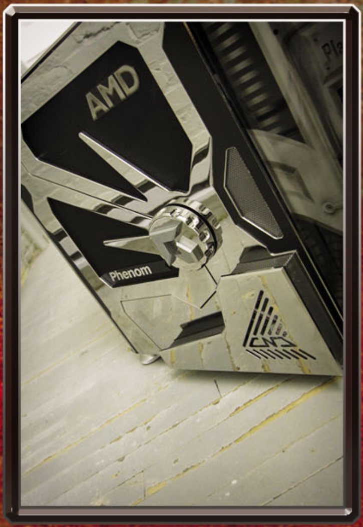
The system is tucked into a Thermaltake SwordM server tower, but as you can see, the case has been heavily customized. The case's design was inspired by the Phenom logo, a silver rocket. Bill imagined what the interior of the rocket would look like and envisioned triangular airlocked doors and lots of recessed surface features. Bill says that the Phenom case was designed as "a futuristic cargo box for highly advanced electronics."

The case's shell uses ¼-inch thick 6061 aluminum that was milled by Craig Guth and then chrome-plated. Bill had PCDesignLab.com design the fan grills he used with the AMD logo. Brad Galvin, a painter for Mnpctech.com, painted the biomechanical image on the back of the case. The milling process was the most time-consuming part of the mod, according to Bill. The case's rotary latch opens the access panels, which is what really makes this PC stand out.

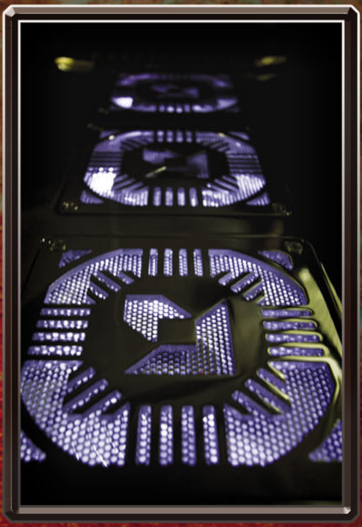
There's no doubt that Project Phenom will turn heads wherever it goes, but Bill is already planning his next mod: a martial arts PC dedicated to Bruce Lee. We're sure that mod will be a hit, as well. ▲



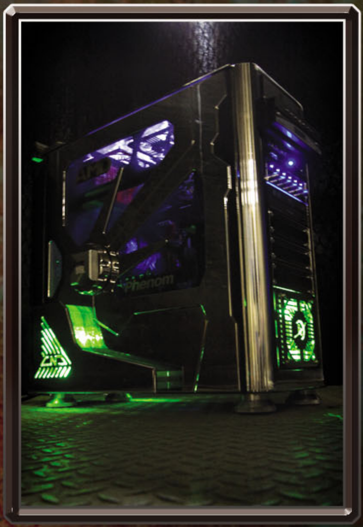
The side panels shown here are made of chrome-plated aluminum and were attached to a Thermaltake SwordM tower.



You can open the case panel by twisting the rotary latch, shown here.

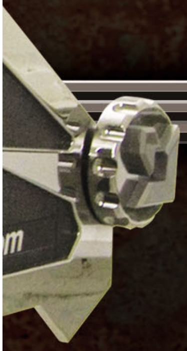


Bill Owen had PCDesignLab.com design the fan grills for this mod, which were cut with a water jet cutter.



Project Phenom after dark: The case is outfitted with several blue and green lights and shows off lots of custom case work.

Photographer: Tom Hawkinson, www.thomhawk.com



# Mad Reader Mod Newsflash

*CPU* and NVIDIA are proud to announce the very first Ultimate Case Mod Challenge, to be held at NVISION '08 August 25-27 at the San Jose Convention Center!

*CPU* magazine is taking Mad Reader Mod on the road to one of the country's premiere LAN events and offering you a shot at fame and fortune. 1st Place: $5,000 cash, a next-generation hardware prize package, and a cover feature in *CPU* on your mod. 2nd Place: $1,000 cash and a next-generation hardware prize package. 3rd Place: $500 cash and a next-generation hardware prize package.

And the deal gets sweeter: NVIDIA will offer the winners of our Mad Reader Mod feature from our July issue through the event date a free trip to NVISION '08, including airfare, hotel, and event admission! (Certain limitations may apply, see NVIDIA's event Web site for full contest info.) So enter your mod at madreadermod@cpumag.com and check www.nvision2008.com for more information.

## Rules:

1. One entry per person (not per seat).
2. Mods that have previously been published in print are ineligible.
3. Judges' decisions are final and are based on the following criteria:

- Technical merit: Creative placement of parts and "outside-the-box" changes you have made to existing components or your case that are likely to have a positive effect on performance.
- Artistic merit: Does the case have a cohesive theme or a distinctive look, or is it simply a collection of parts thrown together behind a window and lighted fans?
- Polish: The fit-and-finish portion of your work. This includes clean, smooth paint; solid cable management; tight, smooth seams; the functionality of your mods (i.e. custom doors and mechanisms); and effective use of lighting.
- "Wow" factor: The judges' overall reaction to your mod.

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TECHNOLOGY. ART. PASSION.
THE WORLD OF VISUAL COMPUTING.

# PC Challenge

## Best $2,000 Intel Gaming PC

Sponsored by: newegg.com®

The "PC Challenge" pits two *CPU* staffers against each other in a contest to build the best PC in a chosen category and within a certain budget. Debuting with the first issue of *CPU* back in December 2001, the Challenge was an instant hit among readers and staffers alike. The feature took an extended hiatus following the April 2003 issue, but you've been asking for it ever since, and it's finally back. We'd like to thank our sponsor, Newegg.com, for supplying all of the parts for both builds.

This month's challenge: To build the best gaming PC for less than $2,000.

Everything you need, nothing you don't.

## Chris

I based my strategery for this Challenge on my belief that gaming is only really fun if you get the total experience. Let's face it, with games like Crysis roaming the streets at night, you pretty much have to compromise somewhere when building a system for less than two grand, but balance is *crucial*. I don't want cutting-edge graphics at the expense of quality, immersive sound, or vice versa.

I felt fairly confident that my overzealous opponent would overlook this bit of gaming Zen, and as usual, I was right. Poor Andrew had to revise his order a couple times due to stock issues, but his initial parts list had him spending twice as much as I on graphics cards but included no speakers and no headphones. Mayhap he intended to use a can and string; I cannot be certain.

He ended up with a headset (after having seen my list, of course), but I'll pit my Logitech X-530 5.1 speakers against it any day of the week. A headset is great for in-game communication—that's why I got one of those, too—but I have a subwoofer, and I'm pretty sure that subwoofer trumps no subwoofer in just about every conceivable case.

In any event, I ordered two XFX 8800 GTs and a board that provides both of them with x16 PCI-E slots for full-fledged SLI goodness. I paired them with a modestly priced but capable Core 2 Duo E6750, then covered my need for a good boot drive by harnessing two

150GB Western Digital Raptors into a striped RAID config, and topped it all off with 4GB of good memory and a Corsair TX750W PSU.

"But," you may be saying to your magazine, "32-bit Windows can't use all that memory!" Right you are, but next to balance, expandability is my next favorite thing, and thanks to the headroom my motherboard and chipset give me to tweak my performance and upgrade any of my components, this baby has plenty of room to grow. Plus I got a great deal on the memory, and 2.5GB is still better than 2GB. When the time comes, you can drop Vista 64 onto this bad boy and you'll be ready to rumble with all 4GB.

I'll give Andrew one thing: He has exceptional taste in monitors. It was purely coincidental that we both chose the same 24-inch widescreen ViewSonic, but I had the benefit of experience. You see, I have the same model in a 22-inch size at home, and its modest price is deceptive. The thing is so bright that it competes with a 50-inch HDTV to light my electronic romper room, and it has provided me with crisp, clean images and vibrant color since day one.

I opted for a mini-ATX Rosewill case for my build and was pretty happy with it, although packing all that stuff into the tiny box was a little challenging at one point. I had to mount one of my Raptors in a 5.25-inch bay above my 8800 GTs because there wasn't quite enough room to install the cards and the drives end-to-end, and the drive bay brackets didn't leave enough room to avoid the PCI-E slots. But everything went in nice and snug in the end, and I had enough room left over in the upper drive bay space to tuck my extra PSU cabling out of the way and keep things organized and neat.

All things considered, I was very happy with the results of my build. It put up very respectable benchmarks that turned out to be pretty competitive with those of the competition. Had Andrew been able to bring his 3870 X2s to bear, I would doubtless have been crushed in this department, but my rig will run any game (even the vaunted Crysis, albeit with less than optimal graphics settings), and it runs many of them very well. Furthermore, all of my tests were run at *stock* clocks, a claim my esteemed colleague can not make.

A little snug, but just enough room is plenty.

## Chris' Scores

| | |
|---|---|
| 3DMark Vantage Overall | P6596 |
| 3DMark Vantage GPU | 8208 |
| 3DMark Vantage CPU | 4150 |
| Company of Heroes (4XAA) | 51.3fps |
| S.T.A.L.K.E.R. | 66.63fps |
| Crysis | 36.39fps |
| World In Conflict (2XAA) | 34fps |

All of that, *and* it sounds as good as it looks. Oh, and did I mention that I have a subwoofer?

## Chris' Parts

| Part | Newegg Item # | Newegg Rating | Price | Shipping | Rebate | Total |
|---|---|---|---|---|---|---|
| XFX MB-N780-ISH9 LGA 775 Nvidia nForce 780i SLI Intel Motherboard | N82E16813141005 | 5 (126) | $249.99 | $7.00 | $20.00 | $236.99 |
| Intel Core 2 Duo E6750 Conroe 2.66GHz | N82E16819115029 | 5 (1020) | $179.99 | $0.00 | $0.00 | $179.99 |
| XFX PVT88PYDF4 GeForce 8800 GT 512MB (Free Company of Heroes) | N82E16814150252 | 5 (298) | $179.99 | $7.59 | $30.00 | $157.58 |
| XFX PVT88PYDF4 GeForce 8800 GT 512MB (Free Company of Heroes) | N82E16814150252 | 5 (298) | $179.99 | $7.59 | $30.00 | $157.58 |
| Corsair XMS2 2GB (2 x 1GB) 240-Pin DDR2 800 | N82E16820145177 | 5 (67) | $70.00 | $0.00 | $30.00 | $40.00 |
| Corsair XMS2 2GB (2 x 1GB) 240-Pin DDR2 800 | N82E16820145177 | 5 (67) | $70.00 | $0.00 | $30.00 | $40.00 |
| Western Digital Raptor WD1500ADFD 150GB 10,000RPM | N82E16822136012 | 5 (930) | $169.99 | $0.00 | $0.00 | $169.99 |
| Western Digital Raptor WD1500ADFD 150GB 10,000RPM | N82E16822136012 | 5 (930) | $169.99 | $0.00 | $0.00 | $169.99 |
| Corsair CMPSU-750TX ATX12V EPS12V 750W Power Supply | N82E16817139006 | 5 (104) | $129.99 | $0.00 | $10.00 | $119.99 |
| Lite-On Black DVD Burner | N82E16827106228 | 4 (366) | $23.99 | $0.00 | $0.00 | $23.99 |
| Rosewill R6425-P BK Black SGCC Steel ATX Mid Tower Computer Case | N82E16811147071 | 4 (81) | $23.99 | $9.99 | $0.00 | $33.98 |
| Microsoft Windows Vista Home Premium SP1 32-bit OEM | N82E16832116485 | 4 (32) | $99.99 | $0.00 | $0.00 | $99.99 |
| ViewSonic OptiQuest Series Q241wb Black 24-inch 5ms Widescreen LCD | N82E16824116104 | 4 (43) | $369.99 | $16.98 | $30.00 | $356.97 |
| Link Depot 6ft. DVI-D Male to DVI-D Male Dual Link Cable | N82E16812189047 | 5 (308) | $9.99 | $5.99 | $0.00 | $15.98 |
| Logitech 980369-0403 3.5mm Supra-aural Premium Stereo Headset | N82E16826104055 | 4 (78) | $13.99 | $6.69 | $0.00 | $20.68 |
| Logitech LX310 Black USB Cordless Standard Desktop Laser Mouse Incl. | N82E16823126032 | 5 (18) | $54.99 | $8.55 | $0.00 | $63.54 |
| Logitech X-530 70 Watts RMS 5.1 Black Speaker System | N82E16836121126 | 5 (506) | $59.99 | $17.78 | $0.00 | $77.77 |
| | | | $2,056.85 | $88.16 | $180.00 | $1,965.01 |

## Andrew

The whole enchilada, with two GPUs on the side.

Even though the legendary travails of the PC Challenges of yore were before my time, I was eager for a chance to stick it to the goateed and mustachioed figurehead of *CPU*. And besides that, who could pass up the fat check from NewEgg to build a gaming PC?

### My Parts List

From the get go, I planned to devote a sizeable chunk of my budget to a multi-GPU setup. One glance at the prices of SLI-capable motherboards, however, was enough to convince me that Nvidia was not TWIWMTBP-OAB (The Way It Was Meant To Be Played-On A Budget). I found the price/performance perfect storm in the form an inexpensive Intel X38 chipset-based motherboard and two GeCube Radeon HD 3870 X2s. Intel's X38 chipset supports dual X16 slots, a must-have for my CrossFireX subsystem. Four GPUs, 1,280 stream processors, and a combined total of 2GB of dedicated GDDR3 memory should deliver some gorgeous eye candy.

I initially selected the Foxconn X38A for my motherboard, but by the time the parts were ordered (three weeks after I submitted my parts list), that motherboard was no longer available at NewEgg. At the last minute, I selected the only other X38-based board in the same price range; DFI's LANParty DK X38-T2R. This choice would come back to haunt me, but at the time, the DFI board had everything I needed; support for two X16 slots and socket 775 Intel processors. The DK X38-T2R also features an integrated eight-channel Realtek ALC885 sound chip, saving me the cost of a sound card. The GeCube Radeon HD 3870 X2s were also out of stock. Fortunately, Sapphire's offering was available and $20 cheaper per card at that (the first of many reasons I came in under budget).

The next component I selected was the display. 24-inch displays at 1,920 x 1,200 resolution represent the sweet spot for gaming these days. The best price I found was on ViewSonic's Optiquest Q241wb, which features an 800:1 contrast ratio, 5ms response time, and even a built-in speaker.

For my CPU, I chose Intel's Core 2 Duo E6850, which features a 3GHz clock speed, 1,300MHz FSB, and 4MB of shared L2 cache. When I originally made the order, NewEgg was offering a Combo Deal on the E6850 and Sapphire's Radeon

**Andrews' Parts**

| Part | Newegg Item # | Newegg Rating | Price | Shipping | Rebate | Total |
|---|---|---|---|---|---|---|
| ViewSonic Optiquest Q241wb | N82E16824116104 | 4 (43) | $369.99 | $16.98 | $30.00 | $356.97 |
| DIAMOND Viper Radeon HD 3870 | N82E16814103050 | 5 (203) | $159.99 | $7.92 | $25.00 | $142.91 |
| DIAMOND Viper Radeon HD 3870 | N82E16814103050 | 5 (203) | $159.99 | $7.92 | $25.00 | $142.91 |
| BFG Tech 800W Power Supply | N82E16817702006 | 4 (17) | $109.99 | $10.25 | $30.00 | $90.24 |
| Intel Core 2 Duo E6850 Conroe 3.0GHz (Combo Deal, -$25.00) | N82E16819115028 | 5 (406) | $159.99 | $0.00 | $25.00 | $134.99 |
| DFI LANPARTY DK X38-T2R | N82E16813136045 | 4 (23) | $184.99 | $7.00 | $0.00 | $191.99 |
| Turtle Beach Ear Force X-52 Gaming Headset | N82E16826502007 | 4 (74) | $45.99 | $7.70 | $0.00 | $53.69 |
| Crucial Ballistix 2GB DDR2-800 Kit | N82E16820146565 | 4 (926) | $54.99 | $0.00 | $30.00 | $24.99 |
| 250GB Seagate Barracuda | N82E16822148262 | 5 (798) | $64.99 | $0.00 | $0.00 | $64.99 |
| NZXT Apollo Black | N82E16811146025 | 5 (359) | $64.99 | $0.00 | $20.00 | $44.99 |
| Logitech G15 | N82E16823126034 | 4 (132) | $79.99 | $9.01 | $0.00 | $89.00 |
| Logitech G3 Laser Mouse | N82E16826104210 | 4 (56) | $39.99 | $7.92 | $25.00 | $22.91 |
| LITE-ON DH-20A4P-04 | N82E16827106228 | 4 (367) | $22.99 | $0.00 | $0.00 | $22.99 |
| Vista Home Premium | N82E16832116202 | 4 (771) | $109.99 | $0.00 | $0.00 | $109.99 |
|  |  |  | $1,628.86 | $74.70 | $210.00 | $1,493.56 |

HD 3870 X2, which slashed an additional $25 off the total price.

AMD recommends running two Radeon HD 3870 X2s with a PSU capable of at least 750W of peak power, so I selected BFGTech's 800W PSU, which features four 12V rails to deliver more than enough juice to my graphics cards and the rest of the system. That the PSU had a $30 rebate was just icing on the cake.

For my hard drive, I found a snappy 7200RPM SATA Seagate Barracuda plenty sufficient with 16MB of cache and an average seek time of 8.5ms. I snagged a great deal on a 2GB kit of Crucial Ballistix DDR2-800 memory, which cost just $25 after a $30 mail-in rebate. LITE-ON stepped up with a bargain sub-$25 optical drive in the form of the DH-20A4P-04 DVD burner.

To make this system LAN-party presentable, I selected the NZXT Apollo PC case in piano black. A quick dimensions check showed plenty of room for my 10.5-inch Radeon HD 3870 X2s. The windowed side panel, blue LED accents, and $20 rebate were all nice touches. I turned to Logitech for my mouse and keyboard. The G15 is the ultimate gamer's keyboard with backlit keys, the GamePanel LCD, and six programmable macro keys. With a $25 rebate, the Logitech G3 laser mouse was a no-brainer: It offers precision that optical mice just can't match.

With a 21-month-old and a practically narcoleptic pregnant wife at home, my audio options were somewhat limited. So instead of a speaker system, I chose the Turtle Beach Ear Force X-52 Gaming Headset, which delivers 5.1 spatial audio without the risk of beauty sleep-interrupting reprisals.

I set aside the requisite cash for the 32-bit version of Windows Vista Home Premium with SP1. When I submitted my order, I didn't have any money left for games, but ATI graciously gifts current Radeon owners with Half-Life 2: Lost Coast and Half-Life 2: Deathmatch (www.steampowered.com/ati_offer1a). I also downloaded Steam and set the PC up with the demo of Portal. Let the gaming begin.

One of my neater builds.

## With Two GPUs Tied Behind Its Back

Once assembled and tested, the system was performing significantly worse than I expected. After determining that none of my components were defective, I started searching online for a solution. I stumbled upon a Customer Review on NewEgg's DFI DK X38-T2R page that stated simply, "not compatible with 3870 X2 cards." A little more searching revealed numerous other users who were encountering the same headaches. DFI's technical support in Taiwan reported that it's a driver issue that ATI is probably already aware of. Fixed drivers were not available at press time.

### Andrew's Scores

| | |
|---|---|
| 3DMark Vantage Overall | P6636 |
| 3DMark Vantage GPU | 7313 |
| 3DMark Vantage CPU | 5193 |
| Company of Heroes (4XAA) | 41.1 |
| S.T.A.L.K.E.R. | 74 |
| Crysis | 32.91 |
| World in Conflict (2XAA, 2XAF) | 41 |

As a result, I was forced to replace the 3870 X2s with the two Radeon HD 3870s we had on hand. (We didn't have any X38 motherboards available to bail me out.) At last check, NewEgg was selling the stock-clocked 3870 for DIAMOND Viper Radeon HD 3870 for $142.91 after shipping charges and a $25 rebate, which puts me another $430 under budget. Looking for an extra edge, I modestly overclocked the graphics card's core clocks to 820MHz (from 775MHz) and the memory clocks to 1,201MHz (from 1,126MHz) using the ATI Overdrive component of the Catalyst Control Center.

There were some insidious forces at work in this PC Challenge, but the most costly of all was one with which I'm very familiar: the deadline. ▲

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## And The Winner Is . . .

Ah, the PC Challenge, the smell of sizzling fresh silicon. . . . We've missed it so. Both contestants designed nice systems on paper, and strictly by the numbers, both systems are comparable in performance. So I'll have to look at the big picture when comparing the two. It's really unfortunate that Andrew's 3870 X2 plan fell through, because I'm sure his system would have screamed through the benchmarks and may very well have given him a victory. But the fact that he had to dial down his rig with another set of video cards, and the fact that he had a lot of cash sitting in his budget when all was said and done, are both knocks against his project. Chris's system is indeed nicely balanced, and his audio system clearly is a cut above Andrew's (although Andrew's headphones are superior to Chris's Logitech set, and given Andrew's particular living situation, are also appropriate for his build). At the end of the day, I'm giving the nod to Chris. Hardware conflicts are a common problem when building a PC, unfortunately, but that's part of the challenge of PC Challenge.

**Michael Sweet**

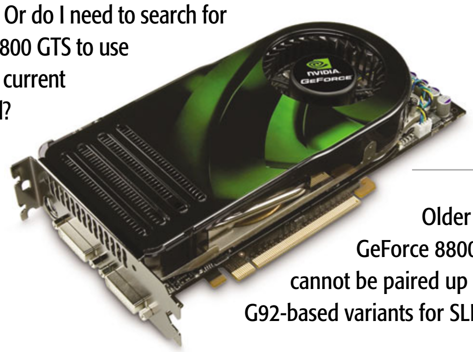
# advanced Q&A corner

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

> “As a general rule of thumb, database applications and database processing taxes the drive subsystem IO more than any other system resource.”

*Each month we dig deep into the mailbag here at* CPU *in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU*’s “Advanced Q&A Corner” is here for you.*

**Brent G. asked:** I was one of the early purchasers last April of an XFX GeForce 8800 GTS card. At the time, I was hoping to upgrade to Windows Vista and to play all of the new exciting DirectX 10 games and leave the possibility open to upgrade to a two-card SLI solution if I wanted it. Fast-forward a year and here I am, finally about ready to upgrade to Vista and hope for more DirectX 10 games. I have dug through the forums and documentation, and they all say you can run two cards in SLI when using the same type of card. However, today when I looked on my favorite online store, all of the GeForce 8800 GTS cards (512MB) are of the G92 variety, while I am certain my 1-year-old 8800 GTS is of the previous G80 variety. Can I configure my old card to work with a new 8800 GTS in an SLI configuration? Or do I need to search for an old 8800 GTS to use with my current XFX card?



Older G80-based GeForce 8800 GTS cards cannot be paired up with newer G92-based variants for SLI operation.

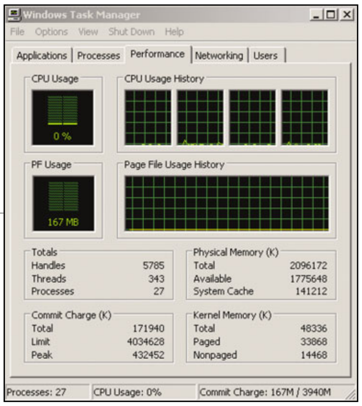
**A:** For now, Brent, you are somewhat out of luck and will need to search for an older G80-based GeForce 8800 GTS card. At the moment, Nvidia doesn’t allow mixing and matching of cards based on different GPU technology, so even though the newer cards are still branded with the GeForce 8800 GTS moniker, they cannot be run in an SLI configuration with the older cards. If it turns out you can’t find a brand new G80-based GTS at any of your favorite online retailers though, don’t forget about eBay and Craigslist. We just took a quick peek for you and found a slew of older G80-based GeForce 8800 GTS cards available for a fraction of their original price.

With that said, we did have a conversation recently with representatives from Nvidia and asked if mismatched SLI may be supported at some point in the future. We figured since AMD/ATI allows different cards to be linked together in CrossFireX configurations, Nvidia may follow suit. As you may expect, it is technically possible for Nvidia to enable SLI with mismatched cards, but they choose not to do so currently for the sake of compatibility and performance. You see, for SLI to perform at its best, the two (or three) cards need to offer similar performance and have similar (although not exact) GPU and memory clock speeds, and similar-sized frame buffers. G80-based GeForce 8800 GTS cards have either 640MB or 320MB frame buffers with 96 SP cores, while G92-based GeForce 8800 GTS cards have 128 SP cores, with 512MB frame buffers—and the memory and GPUs on each card are clocked differently, as well, hence your problem.

Nvidia did say they plan to enable mismatched SLI at some point in the future, but details at the moment are few and far between. If you're itching to upgrade, snatch up an older G80 and save a few bucks until true next-gen cards hit the scene.

**Merle N asked:** I'm a self-employed developer, and I do intensive database work in Access 2003 (XP Pro SP2) almost daily. I sit and fold my arms quite a lot waiting for queries to complete and I want to minimize that. I build my own computers; the current one is an AMD 6400+ at 3.2GHz. I've installed two 74GB 15K Seagate drives in a SAS RAID 0 to speed things up and two SATA 250G drives in RAID 0 for data. All volumes are thoroughly backed up daily. The system uses both processor cores when I do the database work. Usually the process utilizes one core a little more than the other, but the total never exceeds 50%, no matter what.

Of course I'd like to peg both processors. I could go to a quad Phenom 2.5GHz, but not to a $1,500 Intel quad-core. I'm just not sure I'd get more work out of anything newer. I've considered installing SQLServer on the same machine to spread the workload to two processes, but since SQLServer on a networked machine is slower, I'm not sure I'd gain anything. What do you think? Am I stuck in single-thread city forever? Is there anything else I should be doing?



Totals
Handles 5785
Threads 343
Processes 27

Physical Memory (K)
Total 2096172
Available 1775648
System Cache 141212

Commit Charge (K)
Total 171940
Limit 4034628
Peak 432452

Kernel Memory (K)
Total 48336
Paged 33868
Nonpaged 14468

Processes: 27 CPU Usage: 0% Commit Charge: 167M / 3940M

Windows Task Manager illustrates whether or not multiple processor cores are being utilized under the Performance tab.

**A:** As a general rule of thumb, database applications and database processing taxes the drive subsystem IO more than any other system resource. For example, our Web servers at HotHardware.com are configured such that the front-end Web page requests are spread across a fairly robust, load-balanced Web server configuration, while the backend site database (MS SQLServer 2005-based) runs on a single, beefy server that has a hardware-based RAID 5 configuration with 10K RPM SAS disks and a bunch of RAM. If you look at system resources during a spike on one of our busier days, you'll see that the CPU in the database server, a quad-core Xeon, is barely breaking a sweat, while the drive IO utilization is definitely showing signs of the workload. In fact, available drive IO bandwidth is our limiting factor in our current configuration.

With that in mind, Microsoft SQLServer in fact is a multithreaded app, and what you're seeing in Windows Task Manager's Performance Monitor is a balanced distribution of the workload across your available processing resources. So, in short, if you're only seeing 50% utilization and your system remains relatively responsive, then the primary upgrade you should be looking at that will cut time out of your database crunching would be enhancing your hard drive subsystem.

Are those 15K RPM SAS drives actually the target drives for the database work you're doing? If they're not, we would suggest swapping your configuration, moving the OS to the SATA-based RAID, and using the 15K RPM SAS-based RAID for better throughput. If that doesn't cut it, consider throwing more spindles at the job and upgrading to three or more drives in a RAID 5 or 10 configuration with a hardware-based SAS RAID card (we like LSI and 3Ware cards). In addition, if a drive fails in one of these configurations, you'll also have a level of redundancy that you didn't have before in your RAID 0 setup. ▲

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**by Dave Altavilla and Marco Chiappetta,**
**the experts over at HotHardware.com**

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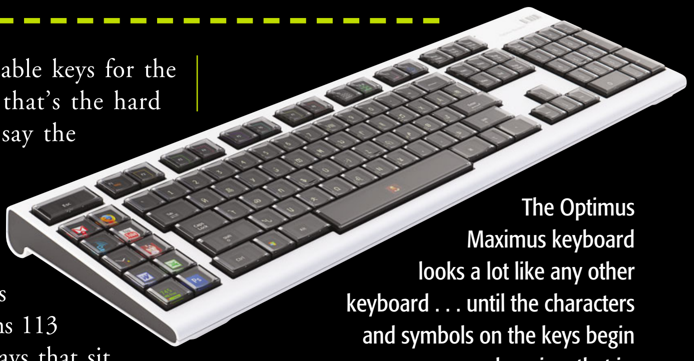
# OLED Optimus Maximus Keyboard

The Art. Lebedev Studio follows a simple motto: Design will save the world. The studio, founded by Artemy Lebedev in Moscow in 1995, "works to find the most simple, elegant, and convenient solution" to problems through design.

With those guidelines in mind, it's probably a natural for Lebedev's studio to develop the Optimus Maximus keyboard. The keyboard provides a theoretically simple solution to a troublesome computing interface problem: Typing in different languages with different character sets. You certainly can use keyboard mapping software to create different symbols, but remembering which symbols are mapped to which keys is the difficult part, especially when those keys show a permanent imprint of English language characters. The theoretically simple solution would be to create a keyboard that could change the symbols and characters on the keys to match the language you're using or to match hot keys you've created.

Creating the changeable keys for the keyboard? Obviously, that's the hard part . . . some would say the *impossible* part.

Lebedev's studio has pulled off the design challenge, though, with Optimus Maximus, which contains 113 tiny color OLED displays that sit inside each key. You can change the OLEDs to display any text character, symbol, or image. (You can display video, too.)



The Optimus Maximus keyboard looks a lot like any other keyboard . . . until the characters and symbols on the keys begin changing, that is.

## Cost vs. Cool

Not surprisingly, the keyboard is expensive. Ridiculously expensive. On the Art. Lebedev Studio's Web site (www.artlebedev.com), the Optimus Maximus keyboard is listed at a cost of $1,864.35. And, although it would appear to be extremely useful in particular circumstances, it's not the kind of keyboard most people are going to find a need to use everyday.

But the "cool" factor is off the charts. Chances are very good that nobody you know will have anything like the Optimus Maximus. Adding to the cool factor for the Optimus Maximus was Lebedev's blog that created excitement and buzz for the keyboard by documenting the step-by-step design of the Optimus Maximus.

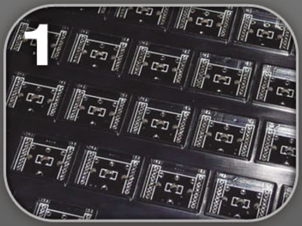
"I did not expect that our keyboard would be so welcomed," Lebedev says. "It's not a secret that people's letters—

## Taking Apart The Optimus Maximus

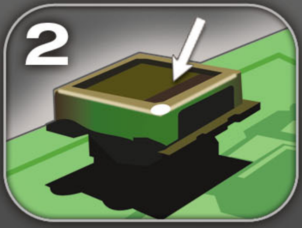
First things first: No, we did not tear apart a $1,600 keyboard to show you how it works. (Not that we wouldn't have done it; we just couldn't get our hands on one of these coveted keyboards.) Instead, Lebedev's studio shared some photos taken during the various development steps.

**Keys.** The unique keys in the Optimus Maximus required some creative design, as shown here. The PCB provides slots for each key configuration (**1**), much like a standard keyboard. The components that make up the key rise vertically from the PCB. Each key contains circuitry for the OLED screen (shown at the top of photo **2**), as well as circuitry to record keystrokes. However, recording keystrokes is tricky as users cannot press on the OLED screen. Lebedev's studio developed a transparent keyboard cover (**3**) that protects the OLED screen and allows the user to see the screen. When the user presses a key, the cover depresses up to 2.5mm (without touching the OLED screen), and a proprietary switch records the movement of the cover as a keystroke, sending the data to the appropriate circuitry.

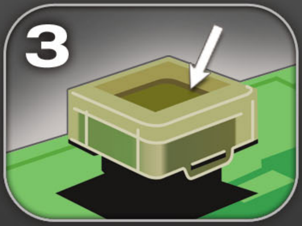
1



2

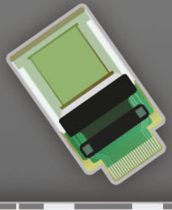


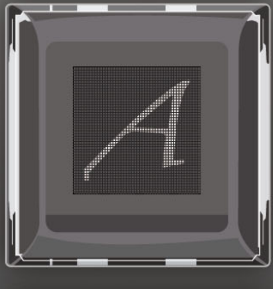
3

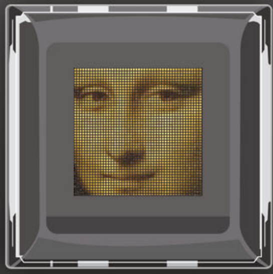


**OLED screens.** These close-up photos (below) show the OLED screens inside each key. In the close-ups, you can see each individual pixel that makes up the screen of 2,304 pixels (48 x 48). The OLED screen, which can display any character, photo, or graphical element, occupies an area of 0.4 inches squared in the center of the key. These standard keys measure 0.8 inches squared.

In the photo at right, you see an early iteration of the OLED screen that's contained inside each key. ▲

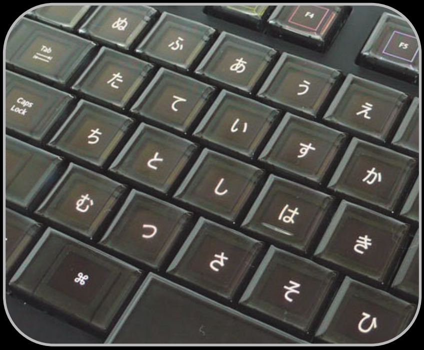






*Source and photos courtesy: Art. Lebedev Studios*

Using the Optimus Maximus' 10 shortcut keys, you can create links to Gmail, Word, Excel, or other functions.



You can choose to display almost any language or set of symbols on the Optimus Maximus keys.

thousands of them—made me believe we should really produce the keyboard."

You can customize each key, changing both the key's display and the command associated with the key. You can set the key to trigger a specific action and use the display to show the key's function. The keyboard makes some changes automatically, too. For example, when typing in standard English language characters, the keyboard changes the key displays from lowercase letters to uppercase letters when you press and hold the SHIFT key.

Optimus Maximus also contains 10 shortcut keys, allowing you to easily access certain functions. During demonstrations, Lebedev's studio links one of the shortcut keys to launching Gmail, and the key can display the number of unread messages you have, updating the number as new messages arrive.

Even though the keys are replaceable (should an OLED fail), the overall keyboard is susceptible to the same dangers from liquid spills as any other keyboard because of its PCB. The studio estimates each display screen should last about 20,000 hours, or about seven years of daily use. When the display begins to fail, it will simply fade over time.

Each keyboard layout is stored on an SD media card, which inserts into a slot on the Optimus Maximus. Lebedev's designers chose a media card to give the keyboard the fastest access to layouts.

## What's Next

Lebedev and his designers aren't stopping their keyboard designs with Optimus Maximus. The studio has shown mock-ups and plans for the Optimus Tactus keyboard, which would not consist of traditional keys. Instead, the keyboard would be a large touchscreen that could display any keyboard layout. As you pressed the touchscreen in the location of the displayed key, the computer would react just as if you had pressed a key on a traditional keyboard. When not using the keyboard layout, you potentially could display a video screen.

And, in late May, Lebedev announced on his Web site plans for the Optimus Popularis keyboard. The initial announcement included only a photo of a foam Popularis mock-up. The Popularis keyboard apparently will be about 75% of the length of the Maximus.

"We will continue to make display keyboards," Lebedev says. "Probably, we will not use OLED technology in the future."

If we've learned anything from the development of the Maximus, watching Lebedev and his designers turn the Popularis and the Tactus from idea into product should be a ride that creates plenty of buzz. If you want that next keyboard from Lebedev's studio, though, we'd suggest starting to save your money now. ▲

**by Kyle Schurman**

## Development Of Optimus Maximus

The time frame from the first sketched design of the Optimus Maximus to the shipping of the first keyboards was fairly short. However, Lebedev says he still experienced a few pitfalls, especially with finding companies willing to take a chance on developing experimental electronics.

"The hardest part was discovering that there's no innovation," he says. "There's no one willing to experiment, and a general lack of interest in anything new within electronics makers." ▲

| | |
|---|---|
| **Oct. 15, 2006.** | Lebedev's first blog entries show a demonstration of the Optimus mini. |
| **Dec. 8, 2006.** | After initially considering a monochrome version of the keyboard using LEDs, Lebedev says the first Optimus keyboard will use color OLEDs. However, he announced the pre-order process, originally set to begin in a few days, would be delayed. |
| **Feb. 22, 2007.** | Lebedev announces keys for the Optimus keyboard will be user-changeable. |
| **March 15, 2007.** | Lebedev shows the keyboard with an exhibit at CeBIT, now officially named Optimus Maximus, and offers some details, including a 113-key layout for the keyboard. At this point, plans called for each key to contain 32 x 32 pixels of resolution in a full-color OLED display with 9 square mm of viewing area. The pre-order price is announced at $1,490. |
| **April 24, 2007.** | Because of a change in the OLED manufacturer, Lebedev announces the keys will actually have 48 x 48 pixels of resolution with 10.1 square mm of viewing area. |
| **May 20, 2007.** | Lebedev receives 200 pre-orders within two hours of opening the Web site, exhausting the initial supply run. |
| **Aug. 3-8, 2007.** | Lebedev posts videos on his blog showing the first tests of Optimus Maximum keys. |
| **Sept. 14, 2007.** | The first Optimus Maximus working prototype arrives at Lebedev's studio. |
| **Oct. 29, 2007.** | Lebedev showcases an Optimus Maximus working prototype to the public for the first time. |
| **Dec. 26, 2007.** | The first Optimus Maximus keyboards are ready to ship, although they will require periodic firmware and software updates. |
| **Jan. 7, 2008.** | Lebedev showcases Optimus Maximus at CES in Las Vegas. |

# IBM's Racetrack Memory

The basic concept has been around at least since the first skyscraper appeared in Chicago in 1885: To gain significantly more space when surface area is limited, expand vertically. Expanding beyond width and length and into a "third" dimension—height—can result in a far more efficient use of surface area.

Expanding vertically doesn't work in all situations—let us know the next time you see a two-story family sedan, for example. However, thinking vertically has sparked a potentially industry-changing idea in computer memory.

The idea of racetrack memory, developed by IBM fellow Stuart Parkin, looks to merge and improve on the best features of traditional magnetic hard drives and solid-state flash memory to create a reliable, low-cost, and low-power storage option. If development continues at the current pace, racetrack memory could appear in products by 2015, potentially replacing common storage options such as hard drives and flash memory.

To make racetrack memory a high-density option, Parkin eventually plans to take advantage of the dimension of height to greatly expand the amount of space available to store bits of data. Parkin says vertical racetrack memory could be the first movement toward three-dimensional microelectronic devices. By expanding memory vertically, storage capacities could increase by 100 times versus what's available today in the same amount of surface area. Initially, though, racetrack memory can provide plenty of benefits while working in a 2D arena.

IBM fellow Stuart Parkin has a track record of success in spintronics and in GMR research, giving him a strong foundation for building success in racetrack memory.

## Determining The Need

Racetrack memory potentially could become a *universal* memory, replacing both major types of storage memory in use today.

**Magnetic hard drive.** If you've ever lost data on a magnetic hard drive because of a failed read/write head, then you understand why a new type of storage would be desirable. Magnetic disk drives don't fail with regularity, but such failures often result in devastating losses of data. The rapid movement of the read/write head as it hovers just above the spinning platter makes a magnetic hard drive susceptible to breaking or crashing into the platter, should you severely jolt or drop your computer while the read/write head is moving.

Magnetic hard drives work well, however, because they're an inexpensive method of storing data and because they can write new data quickly (compared to other options).

**Solid-state flash.** Solid-state flash memory is far less susceptible to sudden failure than a magnetic hard drive, but it's also far more expensive, costing about 100 times as much per megabyte of data stored than a magnetic hard drive. Solid-state flash can read memory quickly, but it writes data slowly. Flash is common in handheld consumer electronics devices.

Racetrack memory would combine the best traits of both types of memory, and even improve them. Racetrack could improve on the low cost and writing speed of magnetic hard disks, along with the reading speed of solid-state memory. Racetrack could offer greater storage density than any other type of memory, making it an inexpensive option. Racetrack would require far less electrical power to operate than solid-state types of memory. By placing racetrack nanowires directly onto a silicon chip, processors would have faster access to memory.

Best of all, though, racetrack memory would be almost indestructible because it wouldn't require the movement of atoms to operate. Flash memory damages atoms each time you write to it, which limits its reusable lifespan to a few thousand writes. Magnetic hard drives move atoms, Parkin says, although in a different sense;

each read/write head contains millions of atoms, all moving in tandem.

"Phase-change memory has the same problem; it's eventually going to fail," Parkin says. "With racetrack, none of those types of failures are possible because no atoms are being changed or moved."

As with a traditional hard drive, moving a powerful magnet over racetrack memory would damage the data, but racetrack memory would not be subject to the physical failures that can affect hard drives and flash.

## Developing The Track

Parkin says he developed the idea of racetrack memory about five years ago, but he didn't discuss it externally until late in 2004.

"We've been working intensively for about three years," he says. "In some senses, we've made tremendous progress."

Recent advances in metal spintronics research have made racetrack memory a possibility at this time. (Spintronics, also called spin-based electronics or magnetoelectronics, is a technology discovered in the late 1980s that takes advantage of the quantum spin states of electrons, either spin up or spin down.)

"In the last five years, we've demonstrated we could rotate magnetic elements in spin valves," Parkin says. "There has been a lot of fantastic work from a lot of others and from our researchers. . . . Any developments in science and technology are based on work others have done. We have a track record. Spintronics has now become a real, proven technology that's viable, which lends it a lot of credibility."

Racetrack memory makes use of magnetic nanowires. With racetrack memory, you can store data within magnetic domain walls. (The domain wall is the interface that separates magnetic domains.) By moving the domain walls along magnetic nanowires—the "racetrack"—stationary nanodevices can read and write the data in the domain walls. In other words, the configuration of domain walls "race" back and forth along the nanowires, passing the nanodevices where the reading and writing takes place.

In the past, manipulating the magnetic domain walls was extremely difficult, requiring significant amounts of electrical power. Parkin and his associates were able to apply spintronics research in the area of spin-polarized current to work around this problem.

Additional past research into memory technologies built on similar principles to racetrack also experienced problems with moving the domain walls quickly enough to allow for the reading and writing of data at acceptable speeds. Parkin was able to fix this problem by using nanosecond pulses of electric current to move the domain walls in sequence.

"We're showing we can move them very quickly, at speeds of 100 to 200 meters per second," Parkin says. "That's a fundamental breakthrough that hadn't been shown before our progress."

Such speeds are especially impressive when you consider the bits of data only have to be moved a few thousand nanometers, meaning the data can slide

## Breaking Down Racetrack Memory

With racetrack memory, the system stores data in magnetic domain walls. The spacing between each wall (the magnetic domain) is the bit length, and pinning sites control the bit length. Pinning sites also protect the domain walls from thermal fluctuations or stray magnetic fields that could damage the data.

Racetrack memory consists of the components shown here.

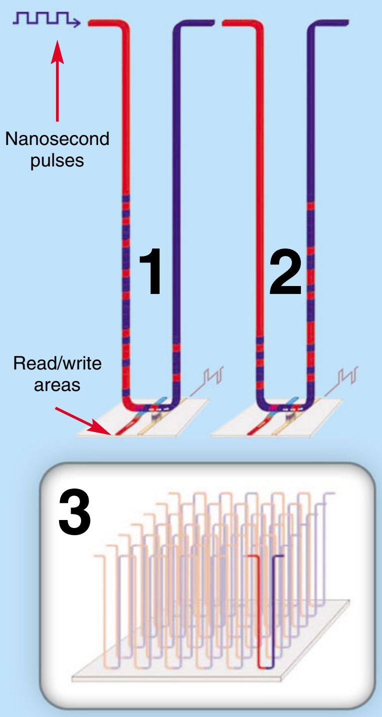
### Vertical Racetrack

To move data across the racetrack nanowire, the system cannot use uniform magnetic fields, as those would ruin the data. Instead, the racetrack memory system uses nanosecond pulses of electrical current, which shifts the entire sequence of domain walls along the nanowire. As you can see from figure 1 to figure 2, the pattern of bits moves in sequence around the racetrack nanowire, passing the read and write areas along the bottom of the nanowire. By applying nanosecond pulses to the opposite end of the nanowire (blue side), the sequence of bits would race around the nano-wire in the opposite direction (toward the red side).

For the system of pulses to be effective in moving the domain walls as a group, it's important that the racetrack nanowires are less than 100nm (nanometers) in diameter and more than 5,000nm (5 microns) in length, which should allow each nanowire to contain up to 100 bits of data.

As you can see in figure 3, a vertical racetrack array would provide a significant amount of storage. However, initial iterations of racetrack memory probably will make use of horizontal nanowires because of the difficulty in manufacturing and developing vertical nanowires.

Vertical Racetrack



Source: IBM

pass the read and write nanowires within a couple of nanoseconds.

### 3D Versus 2D

When developing the concept of racetrack memory, Parkin had two guiding principles.

"First, it's best to build a memory where you don't move atoms," he says. "Moving atoms causes failures. . . . With a disk drive, you're moving a lot of atoms with the read/write head.

"Second, as you shrink the transistor, the scaling of the memory is smaller and smaller in 2D," he says. "We need a paradigm shift, to think of ways to go into the third dimension."

In his initial plans, Parkin envisioned the nanowires standing vertically off the surface of the silicon chip (what he calls a 3D racetrack). Because the space above the surface of the silicon wafer usually isn't used, placing the nanowires vertically into this space makes sense. However, fabricating the nanowires in a vertical configuration is extremely difficult.

As he and his colleagues have developed the technology behind racetrack memory, Parkin realized racetrack memory could provide significant benefits over existing memory technologies even in a horizontal configuration (called a 2D racetrack). The 2D racetrack doesn't offer the storage density of what 3D racetrack would provide, but 2D racetrack storage density still could far outpace magnetic disk drives and solid-state memory.

Eventually, as the technology matures, the developers expect to create a 3D, vertical configuration. For now, placing the nanowires horizontally still will provide plenty of benefits, Parkin says, while the researchers work to make viable vertical nanowires.

"When you compare the potential racetrack memory performance of vertical and horizontal [nanowires], horizontal memory could compete very well with flash memory," Parkin says. "I decided, in the near term, we need to build a prototype to show this."

### Building On Past Successes

Although these types of technological announcements often bring out skeptics in abundance, Parkin says he's mostly received enthusiastic feedback.

"Fundamentally, it's a paradigm shift," he says. "We're conceiving of new types of memory. It's been received extremely well. I've had lots of invitations to talk about the work. We've published a lot of papers. In order to get them into such good journals, it requires your colleagues to think a lot of the work."

The positive feedback really shouldn't be a surprise, considering Parkin's successes in recent research into GMR (giant magnetoresistance). Parkin's developments in GMR in the 1990s have played a key role in developing memory used in today's small consumer electronics devices, such as iPods, as well as in storage for large data centers. The development of GMR was a key component in increasing the storage capacity of magnetic hard drives by about 1,000 times.

### Time To Wait

Over the next few years, Parkin says he expects work with racetrack memory to focus on shrinking the components, finalizing the read/write elements, and building a true working prototype.

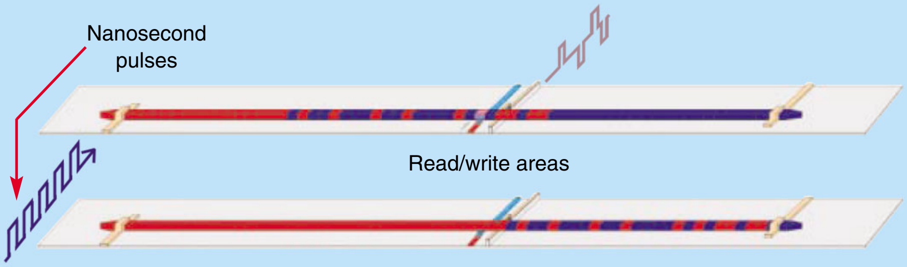
In the initial prototype, Parkin and his team made use of permalloy for the nanowires; permalloy is a magnetic alloy consisting of about 80% nickel and 20% iron. Although Parkin says the researchers will continue looking for other, better materials for the

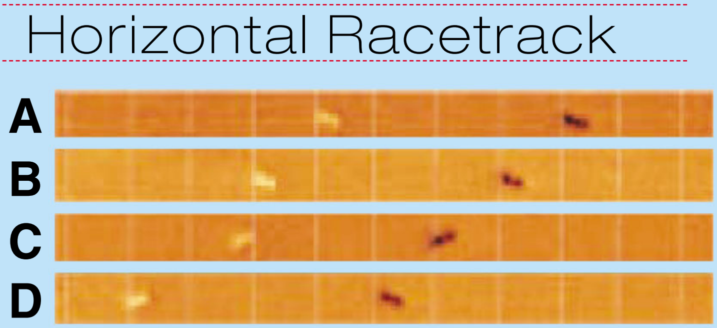
### Horizontal Racetrack

A horizontal racetrack memory configuration wouldn't provide the high-end storage density that a vertical array would provide, but a horizontal racetrack probably will appear first because it's easier to manufacture than a vertical racetrack.

The horizontal configuration works exactly the same as the vertical configuration. As nano-second pulses of current are applied to one end of the nanowire, the pattern of data bits races in sequence toward the other end, moving past the read/write areas.

During a demonstration of racetrack memory, you can see from these images made with MFM (magnetic force microscopy) how the bits move in tandem when pulses of current are applied to the ends of the racetrack. Each of the four orange rows (A through D) represents a sequence in time after the application of a pulse. The bits are about 3 microns away from each other as they move in tandem from right to left.





nanowires, permalloy has shown to be a workable material.

"It's a soft, magnetic material that allows for rapid motion," Parkin says. "Even with permalloy, we can build very interesting memory. Of course, we're still widely searching for other materials."

When asked about the timeline for bringing racetrack memory to the market, Parkin falls back on his experiences with GMR, which he says required about eight years to move from the first prototype to the market. With racetrack memory, Parkin estimates he could have a fully working prototype within three to four years and another two to three years to move the prototype into the manufacturing cycle.

"In six to seven years, we should have something we can manufacture," he says. "That's the timeline I would conceive."

Although racetrack memory remains several years away from appearing in commercial products, IBM has projected that MP3 players with racetrack memory could store as many as 500,000 songs or 3,500 movies, at least 100 times what's possible with today's memory technologies with far less power consumption required.

Such significant changes in data storage capabilities could lead to a significant change in how people use computers and data.

"We're moving into a world that is more data-centric than computing-centric," Parkin says. "There are no obvious obstacles to building a racetrack memory. There's still a lot of work to be done, however."

Even with the remaining work, Parkin's track record and research successes to this point have placed racetrack memory solidly in the pole position in the race to find a universal type of storage memory. ▲

**by Kyle Schurman**

## Storage Density History

IBM's racetrack memory would represent another significant step forward in increasing the density of storage devices. Eventually, racetrack memory could have a storage density of 1 million MB (1TB) per square inch.

**1956.** The first hard drive from IBM, which could store 5MB of data, was called the 305 RAMAC. The unit contained 50 disks, each 2 feet in diameter, and it had a storage density of less than .001MB per square inch.

**1980.** Development of the 5.25-inch hard drive helped jumpstart the market for personal computers. The early 5.25-inch hard drives offered a storage density of about 1MB per square inch.

**1984.** Smaller hard drives, 3.5-inch models, were developed, working well for notebook computers. The earliest 3.5-inch hard drives offered a storage density of just less than 10MB per square inch.

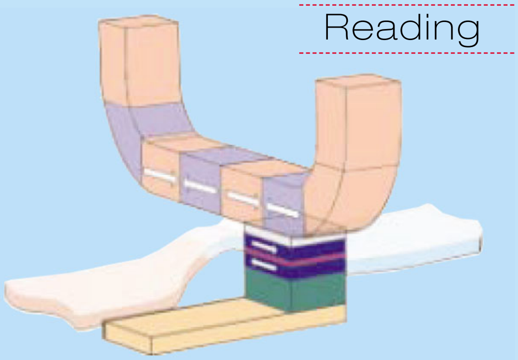
**1999.** With the development of a 1-inch hard drive by IBM, personal electronics devices, such as MP3 players, became more feasible. The first 1-inch hard drives offered a storage density of about 1,000MB (or 1GB) per square inch.

*Source: IBM*

### Reading

When reading the data stored in the magnetic domain walls, racetrack memory uses MTJ (magnetic tunnel junction) magnetoresistive sensing devices that reside very close to the racetrack nanowire. In some cases, the stationary reading device might touch the nanowire.

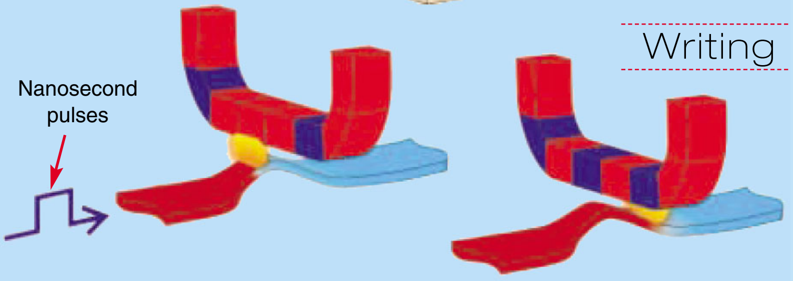
The bits race along the nanowire, passing the stationary reading device. The overall racetrack memory configuration has no moving physical parts.



### Writing

When writing data to the domain walls, racetrack memory potentially can use a few different methods, including nanosecond pulse currents passed through stationary neighboring nanowires (as shown here).

The writing procedure has no moving parts, relying on magnetic pulses and electrical pulses. And the writing procedure changes no atoms, meaning racetrack memory would be extremely reliable and insulated against fatigue and failure that other types of storage memory can experience.



SPOTL

# POWER MOBILE

## The Past, Present & Future Of Portable Computing

There was a time when a portable computer was viewed as the exotic, expensive, and somewhat-flawed brother to the conventional desktop computer we all had sitting on (or more likely, under) our desks. Portable computers were generally a compromise, sacrificing speed and utility for portability, and those of you with long memories will remember when "portable" really meant ("luggable if you have a strong back"). Obviously, this isn't the case anymore.

The portable computers of a decade ago generally came in a one-size- fits-all form factor that we today simply call a general-purpose notebook computer, with prices varying according to both performance and features. Today, in addition to several options in performance and features, notebooks also come in a wide range of form factors, ranging from miniscule UMPCs to extra-large desktop replacement notebooks. These "desknote" computers give up almost no performance to most desktop computers. In fact, for many people, a notebook computer is now suitable for being the only computer, which was an unthinkable notion at one time.

This month, we'll look at all the different form factors the mobile computing industry has to offer users today. That said, every journey must begin with a single step, so here are the basics of what's happened with mobile computing, what's happening today, and what we can look forward to tomorrow.

### The History Of Mobile Computing (Nutshell Version)

Whole books can be (and have been) written about the history of mobile computing, but we'd rather not dwell on the past for too long. As such, we've highlighted those computer models we think are the major milestones in portable computing. See our "A Brief History Of Mobile Computing" sidebar for the rundown.

Broadly, there were several technological breakthroughs that helped push the envelope in portable computing that are worth highlighting. The first was the development of true LCD (or plasma) screen technology, which let thin, lightweight display panels replace the 10-pound, 5- or 9-inch CRT displays that were common on early "luggable" computers developed by Osborne and Compaq, respectively. Storage miniaturization helped out a great deal, replacing brick-like 5.25-inch "full-height" hard drives with 3.5-inch 14mm tall drives. And these eventually gave way to 2.5-inch drives and solid-state storage modules. Transitioning from 5.25- to 3.5-inch floppy diskettes (and then none at all) helped save space and weight, as well.

Battery technology allowed for early portables to work away from a wall socket, but early lead-acid batteries' heavy weight contributed to the "luggable" moniker we joke about today. Nickel-cadmium, lithium-ion, and lithium-polymer batteries have progressively lightened the load, while simultaneously providing levels of power undreamed of by early users.

Obviously, general computing improvements trickled down to portable computers over time and improved the breed, but these are the portable-specific technologies that really allowed for the portable computer to come of age.

### Mobile Computing Today

Portable computers now come in all shapes and sizes, including a form factor you might have thought disappeared 15 years ago. From largest to smallest, portable computers can generally be divided into the following categories: transportables,

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desktop replacements, mainstream, subnotebooks and convertibles, and UMPCs. Here's what's going on with each:

**Transportable (aka "luggable") computers.** If you thought the carry-on suitcase-sized portable computer was a dead form factor, think again. The portable computer (also known as a "lunchbox computer," "sewing machine computer," "portable server," and "luggable computer") is a computer that contains the following: an ATX or mATX motherboard (with room for full-sized PCI/AGP/PCI-E cards in many models), internal and external slots for multiple hard drives and optical drives, a built-in LCD screen ranging in size from 15 to 19 inches, a built-in wired keyboard, and cooling and power to handle quad-core CPUs and high-end video cards—all built into a boxy case with a stout handle. (Which is a good thing, since some of them can weigh close to 30 pounds).

Many transportables don't come with any battery packs, so you're always going to be tethered to a socket with a power cable. And models equipped with batteries might only be able to work off the grid for about an hour or so. These aren't called "super laptops" because they can't be used on your lap; the monitor is usually built into the case in such a way that it needs to be placed on a desk like a conventional monitor, and the keyboard is wired to it via a coiled cable.

Transportable computers can be the ultimate LAN-party computers, since you basically get all of the guts of a desktop computer and monitor built into a single handy box which you can plug in at your destination. DJs can use them as portable digital jukeboxes, because they can support multiple soundcards and projectors. Disaster recovery technicians can use a transportable's numerous drive bays for on-site backup and data recovery.

Such power comes at a premium, with prices ranging from $2,500 to upwards of $8,000 for ruggedized versions the military might use. However, if you have to take your desktop computer with you, transportable computers are the only show in town.

**Desktop replacement notebooks (aka "desknotes").** If you're looking for as much computing power as a traditional "clamshell" notebook form factor can deliver, then you're looking for a desknote, often pitched as a gaming notebook. Despite weighing as much as 11 pounds, such machines can legitimately be called laptops because they can actually be used on your lap (though your lap may get a *tad* warm and tired after extended use).

The new display standard in desknotes is the 17-inch widescreen, supporting resolutions up to 1,920 x 1,200, though gamers who prefer a modicum of real portability can opt for a 15-inch widescreen. The 17-inch screen is large enough that a separate numeric keypad can be added to complement the built-in keyboard. Some desknotes might even have extra programmable keys.

Intel Core 2 Extreme CPUs topping out at 2.6GHz represent the current upper end of desknote processing power, while a pair of Nvidia GeForce 8800M GTX GPUs in SLI are the pinnacle of portable graphics. Such a bulky notebook case (think "2 inches tall" when the clamshell is closed) also has room for a pair of notebook hard drives. Some models make the optical drive hot-swappable with a second hard drive instead. Although most hardcore gamers use a set of headphones, desknotes frequently have better-than-average speakers, occasionally arranged in a surround-sound configuration and assisted with a bottom-mounted subwoofer. Blu-ray drives are frequently a part of the package, transforming the desknote into the ultimate portable movie player.

In short, desknotes are basically conventional notebooks on steroids, intended for users who normally crank up their amps to 11. High-end gamers, movie aficionados, and those users needing a portable RAID setup are the target audience, with prices ranging from $2,000 to $5,000.

**Mainstream notebooks.** Because the widest variety of computers and price points exist in the mainstream notebook market segment, it can be a little hard to generalize. But that doesn't mean we won't try. Prices typically range from about $600 to $3,000, with $1,000 being the price-performance sweet spot that the average consumer is willing to pay.

The latest "must-have" feature of the mainstream notebook is the 15.4-inch widescreen display, which typically delivers a resolution of 1,280 x 800. (More expensive models use LCD panels that can squeeze 1,440 x 900 into those 15.4 inches) The vertical resolution is only just slightly greater than the previous standard of 1,024 x 768, but the extra width is significant, allowing for the convenient use of Windows Vista's or Google Desktop's sidebar of applets, for example. A high-gloss coating is also displacing formerly common antiglare coating on most new notebook screens, which generally provides brighter colors and greater contrast at the expense of extra glare.

They may weigh as much as the Osborne 1, but today's "luggables" deliver heavyweight performance to match their heavy weight.

That's no ordinary screen. Convertibles' touch-sensitive screen and stylus brought a new dimension to data entry on laptops.

These days, $1,000 tends to get you a notebook that would put a 3-year-old desktop computer to shame. Typical compontents include the following: an Intel Core 2 Duo processor, 1GB or 2GB of RAM, about 200GB of hard drive space, a dual-layer DVD burning optical drive, built-in Wi-Fi, and an Aero-capable GPU (often based on Intel's GMA X3100, although Nvidia and AMD mobile GPUs are also available, albeit with a lesser presence). Built-in card readers, Web cams, and fingerprint readers are common, too.

**Subnotebooks and convertibles.** For those users who are willing to exchange speed, screen size, and bells and whistles for a thinner, lighter package, we have subnotebooks. For many years, the subnotebook class was fairly expensive, because further miniaturizing the already miniature took lots of R&D and high-precision manufacturing. But today we have two classes of subnotebook: the "pretty fast and expensive" and the "slow (but probably good enough) and cheap."

The MacBook Air and ThinkPad X300 represent the state-of-the-art in subnotebooks, with prices ranging from about $1,800 for hard drive-equipped models up to $3,300 for models with SSDs. Both offer Core 2 Duo CPUs clocked between 1.2 and 2GHz, 12-inch or 13-inch screens, and keyboards with about 90% of the size of conventional keyboards. The MacBook Air does away with the ThinkPad's multiple USB ports and a built-in optical drive to get even thinner and lighter, but both weigh about 3 pounds and are well under an inch thick.

When it comes to portability, UMPCs laugh in the face of most laptops, even if they have to sacrifice performance and usability.

A new generation of inexpensive subnotebooks, led by the Asus Eee PC, is changing the subnotebook market entirely. By using miniaturized versions of older processors (such as Via's C7 and Intel's Pentium III) with a few architectural updates, older chipsets, low-cost Wi-Fi modules, and LCD displays borrowed from portable DVD players, such subnotebooks can be had for less than $500 and weigh less than 2.5 pounds. Many come with Linux to keep their cost as low as possible, but Microsoft has extended Windows XP's life just for these devices, and some models use it. Although keyboards and screen sizes can be about 75% normal size and processors definitely weaker than usually seen, subnotebooks are normally good enough for general-purpose computing.

Convertible notebooks are generally built on a subnotebook chassis and possess a touch-sensitive screen that swivels 180 degrees and folds back over the keyboard, screen-side-up. A stylus normally comes with these computers, which, when used in conjunction with the touchscreen, allows for on-screen writing (for text entry). The touchscreen-and-stylus combo also facilitates on-screen touching and dragging for interacting with programs and Windows itself. The screen hinge mechanism adds a little weight (think 4 pounds overall), and the touch-sensitive layer tends to reduce screen contrast. Larger convertibles based on conventional notebooks are rarer, but can be cheaper and faster than their smaller counterparts, since it can be more costly to design small convertibles to house the necessary components. Plan on spending between $1,500 and $3,000.

**UMPCs.** UMPCs usually have a 5-inch screen (but some offer resolutions as high as 1,024 x 600);, CPUs from various vendors running close to 1GHz, 512MB, or 1GB of RAM;, and usually solid-state storage. Most weigh between 1 to 2 pounds. Some use touchscreens instead of a mouse, while others have a trackpad or similar input device. Most come with built-in WiFi and at least one USB port, along with a video adapter to let you connect an external monitor. Expect a battery-life of between two and three hours, with prices ranging from $700 to $2,500.

Usability remains a concern with UMPCs. On-screen text is usually small enough to exclude 40-year-old eyes, and touchscreens require deft and agile fingertips. Typing is usually much slower, with keyboards at less than 50% normal width, although Blackberry and Treo users should feel at home.

## The Future Of Mobile Computing

It goes without saying that in the future, portable computers will be faster and lighter, with the low end getting cheaper and the high end fighting for dominance against high-end desktop PCs. Instead, we searched for technologies that might change the face of mobile computing, and came up with the following:

**Nonkeyboard input.** Subnotebooks and UMPCs still make use of keyboards, but their small size can prohibit rapid data input. There may be solutions, though. Voice Dictation, both as standalone programs and as integrated into operating systems (some Vista versions already have a good voice recognition system in place), could replace keyboards as a primary input device if computers came with good microphones or perhaps worked with a Bluetooth-enabled headset/microphone. Built-in Web cams juiced up to read eye movements (large versions are already in use for the disabled) could replace or augment traditional input devices, all of which become clumsier as they get smaller.

**Micro projectors.** The solution to the competing interests of small devices and large displays may be to replace the display entirely with built-in "micro projectors" that transform any light-colored wall into a large screen. In January, 3M showed a half-inch- thick, LED-based projection module that can project a VGA-quality, 40-inch image, with production scheduled to start by the time you read this.

**Multitouch Multidisplays.** Imagine a second, touch-sensitive LCD screen where a typical notebook's keyboard and trackpad reside, much like a Nintendo DS on a larger scale. When typing is necessary, the bottom screen could display a keyboard and trackpad that responded to your touch, and like the Verizon Voyager mobile phone, it could vibrate slightly when every key was cleanly tapped, providing the tactile feedback necessary for fast typing. When typing isn't necessary, it could display, well, anything, such as a larger Windows desktop. This would allow for truly huge displays for large documents, high-definition video, or even custom interfaces for games and multimedia programs.

Historically, portable computers played second fiddle to stationary computers in terms of speed and convenience. However, with improvements in miniaturization and energy management, mobile GPU speed, and with potential interface improvements only available with the portable's form factor, this may not be the case forever. ▲

**by Warren Ernst**

# A Brief History Of Mobile Computing

| Computer | Era | CPU | RAM | Storage | Weight | Significance |
|---|---|---|---|---|---|---|
| **Osborne 1** | 1981 | Z80, 4MHz | 64KB | 2 160KB 5.25-inch floppy drives | 23.5lbs. | First all-in-one transportable computer, complete with 5-inch screen, dual FDDs, and full travel keyboard, letting business people take their data and programs with them. |
| **Compaq Portable** | 1983 | 8088, 4.77MHz | 640KB | 2 320KB 5.25-inch floppy drives | 23lbs. | First IBM-compatible computer ever sold. Included larger 9-inch monitor than competition and ran MS-DOS. |
| **TRS-80 Model 100** | 1983 | Intel 8085, 2.5MHz | 32KB | 32KB Internal + 100KB floppies | 3lbs. | First true laptop device with full keyboard, large LCD text display, and good battery life. |
| **Apple IIc** | 1984-1988 | 65C02, 1MHz | 128KB | 143KB floppy | 3.5lbs. (plus optional battery pack) | First widely available transportable with optional folding LCD screen and car charger adapter. Optional battery pack (stored within its own briefcase) allowed for truly mobile use. |
| **Macintosh Portable** | 1989 | 68000, 16MHz | 8MB | 20MB HD + HD (high-density) 3.5-inch floppy | 16lbs. | First transportable computer with full GUI; Apple's first truly self-contained portable computer; first integrated trackball. |
| **Compaq LTE** | 1989 | 286, 12MHz | 4MB | 40MB HD + HD 3.5-inch floppy | 6lbs. | First clamshell design small enough to be called a notebook. |
| **PowerBook 100 Series** | 1991 | 68000, 16MHz | 8MB | 20MB HD + External HD 3.5-inch floppy | 5lbs. | First notebook with keyboard pushed back, creating palm rests up front. Trackball was positioned where trackpads are positioned today. |
| **Thinkpad 701** | 1995 | 486, 50MHz | 20MB | 720MB HD | 4lbs. | First subnotebook with split-folding "butterfly" keyboard, allowing for a full-sized keyboard wider than the notebook itself. |
| **OLPC XO-1** | 2007 | AMD Geode LX-700, 433MHz | 256MB | 1GB NAND flash | 3.2lbs. | Laptop designed by OLPC (One Laptop Per Child) with the intent to bring laptops to children in developing nations, initially ran Linux-based Sugar OS. |

Osborne 1

Compaq Portable

TRS-80 Model 100

Apple IIc

Macintosh Portable

Compaq LTE

PowerBook 100 Series

Thinkpad 701

OLPC XO-1

[ FROM THE CORSAIR LAB ]

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# Smartphone IQ Test

## Just How Smart Are They?

We demand a lot from our cell phones. In our highly mobile society, we don't want to give up any of the luxuries we enjoy at home, including high-speed Internet and effortless multitasking. Thanks to wireless broadband Internet and the powerful capabilities of today's smartphones, we can search the Internet, check our email, and run mobile applications from nearly anywhere on the planet. Although today's smartphones may not be able to replace a PC in all cases, they've come a long way in recent years. So just how usable are today's smartest phones? Here's a closer look at eight of today's most popular and powerful models.

### Apple iPhone 16GB

There's no doubt the iPhone has a coolness factor unmatched by other phones on the market. As you probably already know, this phone has some unique features not found in other phones, including the advanced Safari Web browser with desktop-like features, multitouch display, and accelerometer that detects when you rotate the device and adjusts the screen orientation to match. By now, you've likely seen the many commercials demonstrating how the iPhone works. In my tests, pinch commands, auto-screen rotation, multiwindow Web browsing, etc. work about as well as you'd expect from watching the ads.

**iPhone 16GB**
$499
Apple
www.apple.com
●●●◐

**Curve 8330**
$599.99
RIM
www.rim.com
●●●●

The iPhone's main downfall is its lack of 3G connectivity. Instead, the phone uses EDGE and Wi-Fi to access the Internet. As this article went to press, Apple had just announced the iPhone 3G, complete with HSDPA, GPS, and iPhone 2.0 software. This new phone will also support Microsoft Exchange ActiveSync out of the box. What's more, AT&T is subsidizing the iPhone 3G, thereby lowering the price to $199 for the 8GB model and $299 for the 16GB model. The iPhone 3G's release will be worldwide, with it being available in several countries on its July 11 launch. (We're speculating that Apple's established deals with worldwide carriers helped make this a possibility.) We're looking forward to seeing if the second-gen iPhone lives up to the hype.

### RIM BlackBerry Curve 8330 (Sprint)

Sprint's version of the BlackBerry Curve 8330 offers two multimedia features not found on Verizon Wireless' version, namely the Sprint Music Store and Sprint TV service, which gives you the ability to download music and watch live TV wirelessly. These services are part of the Sprint Power Vision pack, which ranges in price from $15 to $25 per month. To store music and other files, it's a good idea to use a single, large microSD card since swapping cards is rather inconvenient: The Curve 8330's expansion slot is located underneath the battery. Sprint's Curve 8330 comes with a 1GB card, which is a decent start. As we all know, stereo headphones are a necessity when listening to music or watching TV on a mobile device. RIM made the 3.5mm stereo headphone jack especially accessible by placing it on the side of the phone. Bluetooth is also an option for connecting stereo headphones.

The Sprint 8330 also distinguishes itself from Verizon's offering by adding AIM, Yahoo, and Google Talk instant messaging clients, in addition to BlackBerry Messenger. As the smallest and lightest BlackBerry with a full QWERTY keypad, this phone is designed for messaging and supports multiple email accounts and platforms including Microsoft Exchange, IBM Lotus Domino, or Novell GroupWise.

The Curve 8330 uses a trackball instead of the five-way navigational button found on other smartphones in this roundup. This trackball was very comfortable to use; I especially liked the mouse-like on-screen cursor that was available when I used the phone's integrated Web browser.

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◐ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

**Pearl 8120**
$349.99
RIM
www.rim.com
●●●●

**N95 8GB**
$750
Nokia
www.nokia.com
●●●●

**Treo 750**
$499.99
Palm
www.palm.com
●●●

## BlackBerry Pearl 8120 (T-Mobile)

Upon unboxing the Pearl 8120, the phone's sleek, small design immediately caught my attention. Part of what enables the device to be so slim is RIM's SureType keyboard. Instead of clogging the front of the device with dedicated keys for each letter and function, RIM laid out the SureType keyboard in standard QWERTY order but placed two letters on most of the phone's 20 keys. In my tests, the SureType keyboard was easy to use, and you don't have to tap a key multiple times to choose between letters. Instead, you simply tap as if each letter has its own key, and the SureType figures out what word you had in mind, much like T9 input.

Like the Curve 8330, the Pearl 8120 uses a trackball for navigation. Whereas the Curve 8330 has slightly raised keys, the Pearl 8120's keys are nearly flush with the rest of the device. As a result, the Pearl 8120's trackball sticks up just enough that it is easily pressed while in a pocket or purse. Although not a huge issue, it may be a minor annoyance for some users. (Of course, you can always lock the keyboard to prevent accidental key presses.) On a better note, the Pearl 8120 incorporates an easily accessible microSD slot on the left side of the device, which is much easier to access than on the Curve 8330.

Although the Pearl 8120 lacks 3G, it partially makes up for it with Wi-Fi capabilities. Of course, that means you're at the mercy of an available hotspot if you're looking for a quick download.

## Nokia N95 8GB

The Nokia N95 8GB's steep price tag may deter some, but considering this phone's multimedia, organizational, and connectivity capabilities, it's not a bad deal. One of the features of the Nokia N95 8GB that I particularly liked was the 5MP camera, which gave me enough resolution to justify leaving my camera at home. As you may recall, I reviewed the N95 8GB in the July 2008 issue. Rather than bore you with duplicate information here, we'll point you to page 37 of that issue for more details on the N95 8GB.

## Palm Treo 750 (AT&T)

Although it's been around for a little while, the Palm Treo 750 is still one of the best, full-featured Treos we've seen to date. Of course, there's the newer Centro, but its price tag and short list of features target entry-level users. When Palm released the Treo 750, it touted the phone's internal antenna and redesigned keyboard, but today an internal antenna is pretty much a given. Although the Treo 750 doesn't blow the competition away in terms of new features, it does excel at combining a platform and form factor into a workable device many users have come to love.

One of the ways in which Palm improved upon Windows Mobile's standard features was by adding the ability to search for contacts directly from the Home screen. Thanks to updates that include Windows Mobile 6 and HSDPA, this old phone is able to compete with, and in some ways trump, some of its newer competition with faster data speeds and a newer OS.

Palm bundles a number of applications with this phone, including programs that let you type and edit Word and Excel files and view PowerPoint and PDFs. Should you need additional space for storing documents, the miniSD slot—albeit somewhat outdated—is conveniently located on the right side of the device.

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◐ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

**BlackJack II (AT&T)**
$349.99
Samsung
www.samsung.com
●●●◖

**Touch (Sprint)**
$499.99
HTC
www.htc.com
●●●●

**SMT5800**
$469.99
Verizon Wireless
www.verizonwireless.com
●●●◖

## Samsung BlackJack II (AT&T)

Samsung's original BlackJack was a hit, so when it came time to redesign the handset, the company didn't change much. Instead, it focused on improving the first-generation handset by adding a 2MP camera, GPS radio with optional TeleNav Navigator, slightly faster processor, and twice the memory.

The Samsung BlackJack II runs Windows Mobile 6 Standard and does not have a touchscreen. For navigation, the BlackJack II uses a Jog Wheel that may remind you of an iPod's Click Wheel. Below the Jog Wheel and navigation buttons, you'll find a full QWERTY keyboard. The phone's microSD slot is located on the right side of the phone.

With this phone, you'll be able to edit Word and Excel files and view PowerPoint files, but you cannot create these types of documents. AT&T also included an instant messaging client that supports AOL, Windows Live, and Yahoo! accounts; a RSS reader; and a PDF viewer with the phone.

Many of the phones in this roundup use a mini-USB connector, but the BlackJack II uses its own proprietary connection. This means you'll have an additional cord or two to carry on your journeys, rather than sharing cords and chargers among devices.

## HTC Touch (Sprint)

The TouchFLO interface sets the HTC Touch apart from the rest of the smartphones in this roundup. This cubed UI provides links to your contacts, applications, and other commonly used features. To access the TouchFLO features, slide your finger along the phone's screen from bottom to top. Switching from one side of the cube to the next requires a horizontal swipe. You'll need to press gently while swiping your finger across the screen or the swipes will not register. Still, the swipe motions work very well once you learn how to use them. The swipes used with TouchFLO mimic some of the finger swipes seen on the iPhone, though they're only used within the TouchFLO cube, not throughout the phone.

Using a minimalist design, the Touch has very few hardware buttons and lacks a physical QWERTY keyboard. Instead, the phone relies upon soft keys, a five-way navigational pad, and a soft keyboard for input. The phone's thin design and soft, black finish make the phone very comfortable to hold and carry. The Touch has a microSD slot for expansion, but it's not readily accessible because it's located underneath the battery cover. This phone is also available from Verizon Wireless as the XV6900.

## Verizon Wireless SMT5800

Verizon Wireless' SMT5800 is sleek in design when compared to other Windows Mobile slider smartphones. This phone has a number pad and other handy keys on the front of the device, just below the display. Its face slides horizontally to reveal a full QWERTY keyboard with two soft keys. The number pad on the front of the device is a feature not found on many smartphones today. I liked the tactile feel of using real keys for dialing (as opposed to on-screen keys), but the bubbled keys were somewhat small and close together. As a result, I sometimes pressed two keys at the same time. The QWERTY keyboard was generally comfortable to use; however, the two half-height soft keys were hard to access because they're scrunched above the keyboard next to the edge of the sliding screen.

Like the Blackjack II, the SMT5800 runs Windows Mobile 6 Standard and does not incorporate a touchscreen. As you've seen with other Windows Mobile 6 Standard devices in this roundup, the SMT5800 can view and edit Microsoft Word and Excel documents. It can also view PowerPoint and PDF files.

The SMT5800 uses a traditional five-way navigation key located between the screen and the number pad for navigation. ▲

**by Jennifer Johnson**

## The Smart Kids

| | Apple iPhone 16GB (AT&T) | BlackBerry Curve 8330 (Sprint) | BlackBerry Pearl 8120 (T-Mobile) | Nokia N95 8GB |
|---|---|---|---|---|
| **OS** | OS X | BlackBerry Handheld Software v4.3.0.127 | BlackBerry Handheld Software v4.3.0.115 | Symbian S60 3rd Edition |
| **Dimensions (HxWxD, inches)** | 4.5 x 2.4 x 0.46 | 4.2 x 2.4 x 0.6 | 4.2 x 2.0 x 0.6 | 3.9 x 2.09 x 0.83 |
| **Weight (ounces)** | 4.8 | 4.02 | 3.2 | 4.55 |
| **Screen size** | 3.5-inch, 320 x 480 | 2.5-inch, 320 x 240 | 2.2-inch, 240 x 260 | 2.8-inch, 240 x 320 |
| **Storage** | 16GB flash memory | 96MB flash memory, microSD slot | 64MB flash memory, microSD slot | 8GB internal flash memory |
| **Connectivity** | Quad-band GSM (850/900/1800/1900MHz), EDGE, 802.11b/g, Bluetooth 2.0 | 800/1900MHz CDMA2000 1X EVDO Bluetooth 2.0 | Quad-band GSM (850/900/1800/1900MHz), EDGE, 802.11b/g, Bluetooth 2.0 | WCDMA (850/1900MHz), EGSM (850/900/1800/1900MHz), 802.11b/g, Bluetooth, stereo FM radio |
| **GPS** | None | Yes | None | Yes |
| **Additional carriers** | AT&T | Alltel, Sprint, Verizon Wireless | AT&T, T-Mobile | unlocked, any GSM carrier should work |
| **Strengths** | OS X, Safari Web browser, Multi-Touch touchscreen, accelerometer, proximity sensor | 3G support, smallest BlackBerry with a full QWERTY keypad, Sprint TV, Sprint Music Store | Slim design, Wi-Fi | Unlocked phone, 5MP camera with video capabilities, assisted GPS, numerous connectivity options |
| **Weaknesses** | Price (due to lack of carrier subsidy), no 3G connectivity, no GPS | No Wi-Fi, poorly placed microSD slot, no Microsoft Office document editor | No 3G support, no GPS | Price (due to lack of carrier subsidy) |
| **Cost** | $499 | $599.99 | $349.99 | $750 |
| **CPU rating** | ●●●◖ | ●●●● | ●●●● | ●●●● |

| | Palm Treo 750 (AT&T) | Samsung BlackJack II (AT&T) | HTC Touch (Sprint) | Verizon Wireless SMT5800 |
|---|---|---|---|---|
| **OS** | Microsoft Windows Mobile 5.0 (an upgrade to WM6 is available) | Microsoft Windows Mobile 6 Standard | Microsoft Windows Mobile 6 Professional | Microsoft Windows Mobile 6 Standard |
| **Dimensions (HxWxD, inches)** | 4.4 x 2.3 x 0.8 | 4.4 x 2.3 x. 0.4 | 3.98 x 2.34 x 0.54 | 4.1 x 2 x 0.7 |
| **Weight (ounces)** | 5.4 | 3.52 | 4 | 4.2 |
| **Screen size** | 2.5-inch, 240 x 240 | 2.4-inch, 320 x 240 | 2.8-inch, 320 x 240 | 2.4-inch, 240 x 320 |
| **Storage** | 128MB ROM, 64MB RAM, miniSD slot | 256MB ROM, 128MB RAM, microSD slot | 256MB ROM, 128MB RAM, microSD slot | 128MB ROM, 64MB RAM, microSD slot |
| **Connectivity** | Quad-band GSM (850/900/1800/1900MHz), EDGE, Tri-band UMTS, upgradeable to support HSDPA, Bluetooth 1.2 | Quad-band GSM (850/900/1800/1900MHz), EDGE, Tri-band UMTS, HSDPA, Bluetooth 2.0 | 800/1900MHz CDMA2000 1X EVDO Bluetooth 2.0 | 800/1900MHz CDMA2000 1X EVDO Bluetooth 2.0 |
| **GPS** | None | GPS support for TeleNav Navigator | None | None |
| **Carriers** | AT&T | AT&T | Alltel, Sprint, Verizon Wireless | Verizon Wireless |
| **Strengths** | 3G support, popular form factor, Palm improvements to Windows Mobile for greater usability | 3G support, TeleNav GPS, AT&T Music, and Cellular Video | 3G support, slim design, TouchFLO interface | 3G support, hardware number pad, slim design |
| **Weaknesses** | Low-resolution and small screen, thick design | No Wi-Fi | No Wi-Fi or GPS | No Wi-Fi or GPS |
| **Cost** | $499.99 | $349.99 | $499.99 | $469.99 |
| **CPU rating** | ●●● | ●●●◖ | ●●●● | ●●●◖ |

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

# Small Wonders

## Subnotebooks & UMPCs That Are Worth Their Weight

The Ultra-Mobile PC and Mobile Internet Device markets are incredibly hot at the moment. Although they've existed in one form or another for a number of years, it wasn't until mid-2007 when Asus first unveiled its initial lineup of Eee PCs that interest really took off. Although Asus wasn't the first company to introduce a UMPC, Asus was first to offer a truly attractive subnotebook, with virtually all of the features of a traditional notebook To make matters better, Asus released the Eee at a low enough price to put it within reach of the vast majority of technology consumers.

Asus' introduction of the Eee PC and its subsequent success spurred many other companies into action. In the past year, a multitude of new subnotebooks and UMPCs have been announced or released in several price ranges from major players such as HP, Acer, and Samsung. And the current crop is more diverse than ever. To that end, we've rounded up a trio of current ultra-mobile offerings to show you a sampling of what's out there to help you decide if what's currently available would be a viable complement to your current PCs.

### Asus Eee PC 900

The Asus Eee PC 900 is the follow-up product to the original and incredibly popular Eee PC 700. Currently, the Eee PC 900 is offered in two configurations, a 20GB model that's outfitted with a custom Xandros-based Linux operating system and a 12GB version that includes Windows XP Home. We tested the Linux version here. The different storage options for the two OSes lets Asus offer both units at the same $549 MSRP. Please note, however, the flash storage is not one contiguous block on these units. The OS actually resides on 4GB of internal flash memory, and 16GB (Linux) or 8GB (Windows) socketed modules are used for the remainder of the storage.

Other than increased storage, the main differentiating factors separating the Eee PC 900 and 700 series are screen size and the default memory configurations. The Eee PC 900's stock 1GB of DDR2 RAM is as much as four times the amount in the initial 700 series models, which came with 512MB or 256MB. And to good effect, as the perceived performance of the Eee PC 900 was markedly better than the previous models. We also thought the Eee PC 900's new 8.9-inch LCD, which offers a resolution of 1,024 x 600, is far more useful for day-to-day computing than the 700's 7-inch, 800 x 480 screen, which required side-scrolling for virtually any Web page. The new screen was also somewhat brighter than the original's (although not by much).

A 900MHz Intel ULV Mobile Celeron M processor powers the Eee PC 900. Intel's 910GML chipset complements the processor and provides integrated graphics. HD Audio is offered on the Eee PC through the use of a Realtek ALC6628 codec; 10/10 Ethernet and 802.11g are also along for the ride. As for the unit's connectivity options, the right side of the Eee PC 900 has a VGA output, two USB 2.0 ports, and an SD card slot (which supports standard SD and SDHC cards). The left side has a 10/100 Ethernet jack, a single USB 2.0 port, and headphone and microphone jacks. In this configuration, the Eee PC 900 offered us just over three hours of battery life.

The Eee PC 900 has a traditional keyboard and touchpad much like any other notebook, except a little smaller. Something interesting to note, however, is that the Eee PC 900's touchpad supports multitouch gesture recognition. Using specific two-finger movements, the 900's touchpad can be used for scrolling up, down, and side-to-side, and for zooming in and out of photos—similar to an iPhone or MacBook Air. The system's keyboard was somewhat of a disappointment. It felt flimsy and had a lot of flex,

**Eee PC 900**
$549
Asus
www.asus.com
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and it was too small for adept touch-typists with larger-than-average hands, but it got the job done, nonetheless.

Other options on the Eee PC 900 include a built-in microphone and Web cam, which are mounted along the top edge of the screen's bezel. The 1.3MP Web cam worked fairly well, and the machine had the horsepower to capture smooth video. But the internal microphone was quite noisy and should only be used for rudimentary recording. We'd definitely recommend using a better-quality external microphone for any type of VoIP communication.

Perhaps the Eee PC's most interesting feature is its OS installation (at least for the Linux-based version). First, the OS loaded in about 15 seconds. And when it did, we were greeted to a number of nicely arranged tabs and menus that are home to a myriad of included applications, which themselves loaded very quickly. The Linux-based system ships with a broad swath of apps, including Open Office, Skype, an image-editing program, and a number of basic games.

After using the Eee PC 900 for a number of weeks, it was clear Asus had done a fine job with the system. Its price puts it in competition with much more powerful, full-sized notebooks, but standard notebooks can't compare to the Eee PC 900 in terms of mobility. If you're itching to test the subnotebook waters, definitely give the Asus Eee PC 900 some consideration.

**2133 Mini-Note**
$749 (as tested)
HP
www.hp.com
●●●◖

## HP 2133 Mini-Note

Even before powering up the system, it is obvious HP put a lot of thought into the 2133 Mini-Note's design. Everything from the system's brushed-aluminum casing to its high-gloss screen and nearly full-sized keyboard exude quality. And looking at its specifications and configuration options, the HP 2133 Mini-Note seemingly offers something for everyone in the market for a subnotebook. There were some drawbacks to the 2133, however, that prevented it from being truly great.

Using the HP 2133 Mini-Note was generally a pleasure. The unit's keyboard (about 92% the size of a standard laptop keyboard) and relatively high-resolution screen (1,280 x 768) for its size were definite plusses. Considering the 2133's overall size, the keyboard was surprisingly good, with great tactile feedback and a sturdy, solid feel. And touch-typists shouldn't have any problem getting used to its layout, either. We should also note that the keyboard is coated with a hard layer of protective material that is designed to prevent the normal wear and tear associated with plastic keyboards.

As we've mentioned, the unit's screen was very good. Web browsing and word processing on the 2133 was great. And the screen's high-gloss coating produced excellent contrast. One complaint we have with regard to the screen, however, is its default brightness level. When first powered up, the 2133's display was way too dark for our liking. We had to maximize the screen's brightness, which had the side effect of hindering battery life considerably. In our testing, using a 6-cell battery (3-cell batteries are also available), the HP 2133 Mini-Note's battery lasted a little over four hours with the display at its default level, but when we bumped up the brightness, battery life dropped to about three hours.

The HP 2133 Mini-Note can be configured with a wide range of storage options, which includes standard 2.5-inch hard drives or more-durable, but lower-capacity, SSDs. HP offers a range of CPU speeds and memory configurations, too. The unit we tested was equipped with the fastest CPU available to the 2133, a 1.6GHz VIA C7-M, and 2GB of RAM. In this configuration, the system was definitely usable and felt somewhat snappy when performing basic tasks. But the CPU is not up to any kind of real multitasking, and processor-intensive applications slowed the machine to a crawl.

The 2133's integrated accessories all worked very well, and the unit offers more expansion possibilities than most UMPCs, thanks to its ExpressCard slot. Overall, we think the HP 2133 Mini-Note is an excellent UMPC platform that happens to be a bit underpowered. Hopefully, next-gen units rumored to be based on the more powerful VIA Nano processor can correct this shortcoming, because the 2133 Mini-Note is undeniably sexy.

## Samsung Q1 Ultra

At first glance, it's abundantly clear that the Samsung Q1 Ultra is in a class of its own. It isn't exactly a tablet PC, but it's not quite a MID. The best way to describe the Q1 Ultra is a somewhat of a hybrid that unquestionably strays from the norm.

# Specifications & Features

The tiny titans we've featured here differ in a number of ways. To help you more quickly and easily spot some of the major differences, we've summarized their features, memory complements and storage formats, screen size, resolutions, and other various highlights. Also, be mindful that all of these products are available in other configurations, with differing storage and connectivity options, operating systems, etc. The specifications and features listed here designate the products as we tested them. Please consult the manufacturers' respective Web sites for the other configuration options available. ▲

| | Asus Eee PC 900 | HP 2133 Mini-Note | Samsung Q1 Ultra |
|---|---|---|---|
| **CPU** | Intel Mobile Celeron | VIA C7-M ULV | Intel UM A110 |
| **CPU clock** | 900MHz | 1.6GHz | 800MHz |
| **Graphics** | Intel GMA900 | VIA Chrome 9 | Intel GMA945 |
| **Memory** | 1GB DDR2 | 2GB DDR2 | 1GB DDR2 |
| **Storage** | 20GB (4GB + 16GB) | 120GB SATA | 80GB |
| **Storage type** | Flash | Hard Disk | Hard Disk |
| **Expansion** | SD/MMC Card Slot | ExpressCard, SD Card Slot | SD Card Slot |
| **Connectivity** | 3x USB, VGA, earphone, Microphone, LAN | 2x USB, VGA, earphone, microphone, LAN | 2x USB, VGA, Earphone, LAN |
| **Wireless** | Wi-Fi (Bluetooth optional) | Wi-Fi (Bluetooth optional) | Wi-Fi, Bluetooth |
| **Screen size, inches** | 8.9 | 8.9 | 7 |
| **Screen resolution** | 1,024 x 600 | 1,280 x 768 | 1,024 x 600 |
| **Input** | Keyboard, touchpad | Keyboard, touchpad | Thumb-keyboard, mouse-stick, touchscreen |
| **Extras** | 1.3MP Web cam | VGA Web cam | 1.3MP Web cam, Fingerprint reader |
| **Battery life** | 3 hours | 4.2 hours | 3 hours |
| **Weight** | 0.99kg (2.2lbs) | 1.27kg (2.8lbs) | 0.7kg (1.6lbs) |
| **Dimensions (cm, HxWxD)** | 3.4 x 22.5 x 17 | 2.7 x 25.5 x 16.5 | 2.39 x 22.7 x 12.4 |
| **OS** | Windows XP, Linux | Windows XP/Vista, Linux | Windows XP/Vista |
| **Price** | $549 | $749 | $789 |
| **CPU Rating** | 3.5 | 3.5 | 2.5 |

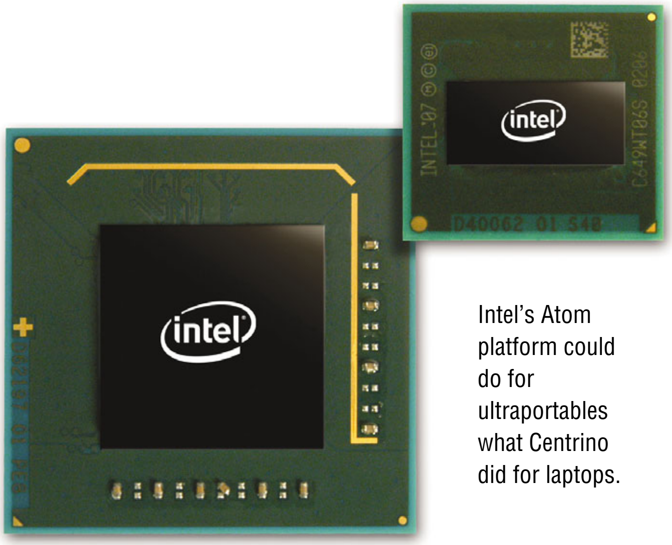
**Q1 Ultra**
$789 (as tested)
Samsung
www.samsung.com
●●◖

Although it definitely has some useful features, such as a 7-inch touchscreen and a built-in Web cam with stereo microphones, we found the Samsung Q1 Ultra to be mostly awkward to use. The split, thumb-type keyboard's keys, for example, were tiny and hard to press. The system's integrated mouse-stick was also too sensitive and relatively inaccurate, and using the stylus directly on the touchscreen in lieu of the mouse felt sluggish and occasionally tracked erratically. We did find the Q1 Ultra's character recognition to be nearly spot on, but that wasn't enough to overcome the system's other shortcomings.

As for expansion and connectivity, the Samsung Q1 Ultra offers a surprising amount of options for its diminutive size, which includes Wi-Fi and Bluetooth support, dual USB ports, VGA, Ethernet, and an SD card slot. And battery life was pretty good at about three hours. But unless the touchscreen and Tablet PC-like functionality are high on your list of priorities, we think you'd be better served by a subnotebook like those mentioned. ▲

**by Marco Chiappetta**

# Intel Unveils Atomic Power



Intel's Atom platform could do for ultraportables what Centrino did for laptops.

Although the company had talked about its upcoming ultra-low-power processor, code-named Silverthorne, on numerous occasions in the past, Intel used the IDF show in Shanghai this year to formally unveil the specifications and features of the new Centrino Atom processor and platform.

Like the Centrino platform for notebooks, the Centrino Atom platform for UMPCs, MIDs, and subnotebooks consists of a processor, chipset, and wireless controller. The Centrino Atom platform also necessitates a battery and small-form factor enclosure, however.

During its approximate three-year development cycle, the Centrino Atom platform was known by the code name Menlow. The processor at the heart of the platform—the Atom, as it is now known—is based on totally new microarchitecture, designed from the ground up to be ultra-low-power. Initial rumors postulated that Atom would be a derivative of the Pentium M like the current Intel A100 series, simply tweaked for even lower power operation. Atom, however, turned out to be a completely new design.

When tapped to design the Atom, engineers at Intel had a few strict goals for the platform. Of course, it had to be low power, but it also needed to offer enough performance to adequately run modern operating systems such as Windows Vista, and it had to be scalable to fit into a broad range of devices. To achieve their goals, Atom ultimately ended up with an in-order execution engine. To put it simply, that means the Atom processes instructions in the order in which they are received. This is an important differentiator, because all of Intel's other current desktop and mobile processors employ OOO (out-of-order) designs. Out-of-order execution typically offers better performance, but Intel found that the in-order execution engine used in Atom used much less power.

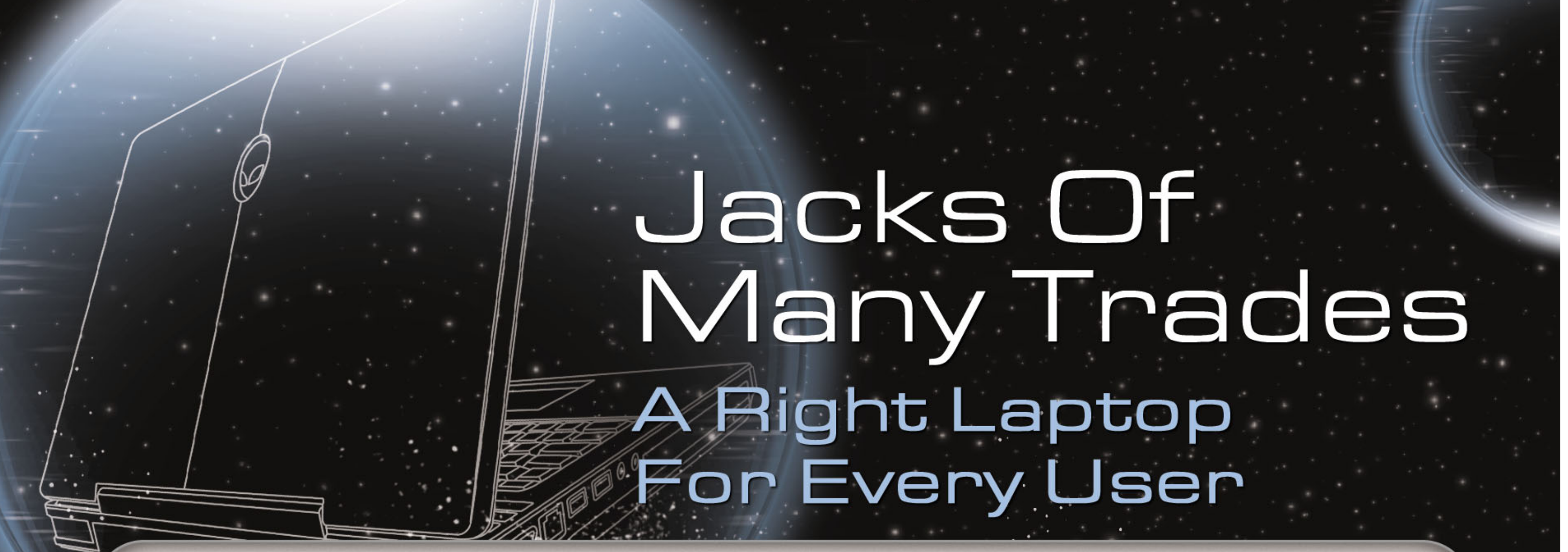
That's not to say Atom is somehow less capable than an OOO design. Intel took additional steps and outfitted Atom with a number of features that enhance its performance. For example, Atom incorporates HT (Hyper-Threading) technology like the now defunct Pentium 4. HT lets the execution units in the CPU work on a second thread, should the initial thread be stalled. HT's pseudo-SMP capabilities will allow the Atom to perform better with multithreaded software and applications. Atom also offers Intel Virtualization Technology, Execute Disable Bit support, 64-bit extensions, and SSE3.

In addition to the aforementioned features, Intel also incorporated some new features designed to further lower the Atom's power requirements. The Atom processor has a new C6 low-power halt state that powers down much of the chip when it's not in use and more traditional clock gating technologies are employed, as well. Depending on clock speeds and voltage, Atom processors can consume as little as 0.65 to 2.4 watts. The Atom's low power requirements seem more impressive considering the core is comprised of approximately 47-million transistors and is manufactured using the same high-K 45nm process node and current desktop parts. We should also note that Atom's die is roughly 24.2mm$^2$, which makes it Intel's "smallest" x86-compatible CPU.

As we've already mentioned, an integral part of the Centrino Atom platform is a new chipset designed for ultra-mobile applications. Internally, the Centrino Atom System Controller Hub was referred to as Poulsbo. What is interesting about the part is that it is a single-chip design that incorporates features traditionally found in both north- and southbridge chips, albeit in a more limited fashion. Poulsbo sports two PCI-Express x1 ports, eight USB 2.0 host ports, one USB 2.0 client port, 2 SDIO/MMC ports, an IDE port, and a memory controller that supports up to DDR2-533. In addition, Poulsbo accelerates HD decoding and features an IGP with a 400M pixel peak fill rate and support for the DirectX 9 and OpenGL APIs.

Initial Atom processors will launch at clock frequencies ranging from 800MHz to 1.86GHz. All of the processors will include 512KB of L2 cache. Two entry-level offerings will employ a 400MHz FSB, and three higher-end variants will use a faster 533MHz FSB. The three higher-end products will also offer support for Hyper-Threading, whereas the lower-end units do not. We expect that the Atom processor and Centrino Atom platform as a whole will be widely adopted across the industry, because of their low power requirements and compatibility with existing software. In fact, as we went to press, numerous product announcements came out of the Computex show in Taipei of the Atom platform and Atom-based products.

Looking to the future, Intel is also planning an assault on the smartphone market with the Moorestown platform. Many details are still secret, but speculation is that Moorestown will be similar to the Centrino Atom platform in terms of features, but the CPU and System Controller Hub will be integrated into a single piece of silicon, essentially making it a system on a chip. Moorestown should also have even lower power characteristics than the Centrino Atom platform, but we're going to have to wait until late 2009 or 2010 for products based on the platform to give us a definitive answer. ▲



# Jacks Of Many Trades

## A Right Laptop For Every User

Sales figures tell us that average people buy average notebooks (duh). And an average notebook costs about $1,000 and is about 5 or 6 pounds of "lug" for that average notebook computer user, who intends to do average tasks with it.

Of course, we know you're not an average user. The extremes are definitely more interesting, and it got us thinking about notebook computers on the extreme edges of the notebook spectrum. Are inexpensive notebooks built well enough, and are they fast enough? Are super-expensive fast notebooks worth their size and weight for the performance they provide? Are ultra-portable notebooks big enough to perform real work and play? We aimed to find out.

Our rogues' gallery of notebooks is a diverse one. Lenovo's new consumer-grade notebook line is the IdeaPad, and the Y510 represents a "high-value" notebook frequently advertised in Sunday newspaper ads from big-box stores. These normally come with rebates to sweeten the deal; ours ended up costing $529 when the rebate checks came back, down from about $779. Alienware notebooks generally combine high style with high performance, and the m15x is no exception: It offers pretty much every bell and whistle a notebook could offer, while its 15-inch screen still affords it some actual portability—all for a cool $4,523. Finally, CyberPower's 17-inch widescreen Xplorer X7-8800 represents what a big and heavy notebook can do, yet it also does without some of the frills associated with Alienware and others. At $2,999, it's a high-performance bargain.

Needless to say, simply reporting benchmarks and rating these notebooks based on their speed alone is pointless, as is simply ranking the lightest notebook the best portable, or the cheapest notebook the best value. Instead, we lived with these notebooks for a while and got to know them intimately, letting their stark differences highlight the benefits of each. We determined what each is really suitable for, taking ergonomics into account. To be sure, each got the full suite of benchmarks you've come to expect from *CPU*, but this month, these four notebooks got a little more.

### Lenovo IdeaPad Y510

The IdeaPad Y510 is Lenovo's first "consumer-oriented" notebook model, as opposed to the ThinkPad's line, intended for business use. As such, it has features Lenovo feels are those home users want. In goes a glossy screen, stereo speakers with a subwoofer, a Web cam, and a certain degree of style normally lacking from ThinkPads. Out goes the "eraser head" pointing device, magnesium frame, fingerprint reader, keyboard light, and hard drive shock sensor.

Y510s aren't generally customizable: Lenovo offers about six configurations from its Web site and another configuration to different big-box stores, usually with significant rebates. As a result, you may need to search to find exactly the setup you want. Our test unit included a 1.6GHz Pentium Dual Core T2060 (think Core 2 Duo but with half the cache), 250GB 5,200rpm hard drive, 2GB of RAM, Intel's X3100 display adapter, 802.11g, and a dual-layer DVD burner. Other features include jacks for S-Video out, Ethernet, and modem; three USB, one FireWire, and one VGA port; and ExpressCard and SD card slots. It was the least-expensive configuration we could locate.

Surprisingly, Lenovo baked in a surprisingly high level of fit-and-finish and style. The keyboard was near-ThinkPad quality flex-free under heavy typing, while the trackpad was nicely textured with responsive, yet soft, mouse buttons. The 15.5-inch widescreen (1,280 x 800 native resolution) is coated with the glossiest finish we've ever seen, and the glossiness extended right to the edge, making for a "frameless" display; combined with the MacBook-like hinge, it looked much larger than it really was. The top shell is textured, resembling linen, which hid fingerprints well. The Web cam comes with VeriFace facial recognition software, allowing your face to replace your Windows password, though we found eyeglasses and lighting changes could confuse it, keeping us from logging on. The chassis was pleasingly creak- and flex-free.

**IdeaPad Y510**
$779 (as tested; $529 after rebate)
Lenovo
www.lenovo.com/us/en
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Processing speed, while dwarfed by the high-end machines reviewed here, was surprisingly usable nonetheless. High-end games really needed their detail and resolution turned down in order to be playable, but office applications, Web browsers, and email programs launched quite quickly (within just a second or two of the Big Boys), DVDs played without stutters or tearing, even at fullscreen, and Vista's Aero Interface felt snappy. The Dolby-certified, 4.1 surround-sound speakers were clearly the best-sounding speakers of the group by far, though the overly loud DVD drive spoiled the effect during movies. Consider ripping them to the hard drive first.

Lenovo made a few missteps, however, and the low price precludes some desirable features that may be worth an upgrade. The screen isn't recessed, so it can rub against the keyboard when the unit is closed. Battery life wasn't that great, and the battery's position on the underside won't allow for extended batteries. The touch-sensitive multimedia buttons were slow to respond and automatically fired up Windows Media Player, rather than being universal. Bluetooth isn't available at this price point, either.

In short, we're pleased to report on how much notebook you can get for less than $600. The Y510 is well-suited for anyone needing portability on a budget who'll play their games at home on their desktop.

## CyberPower Xplorer X7-8800

CyberPower has grown into one of the larger independent mail-order system builders, offering a wide range of desktops and notebooks. From among more than a dozen different chassis, CyberPower can whip up hundreds of custom combinations. The builder supplied us with a monstrous (and monstrously fast) desktop replacement notebook that, given its performance, we consider a good buy at $2,999.

Our X7-8800 came with a 2.8GHz Intel Core 2 Extreme X9000, an Nvidia GeForce Go 8800GTX, 4GB of RAM, a 200GB hard drive, dual-layer DVD burner, and 802.11n. Also included were four USB ports, a FireWire port, fingerprint reader, Web cam, DVI and S-Video outputs, and Ethernet, modem, and serial ports, plus an SD card reader and ExpressCard slot. Topping it all off was an eye-popping 17-inch, glossy widescreen display with a 1,920 x 1,200 native resolution that we found tough to take our eyes off of, especially when watching HDTV with the built-in television tuner.

Obviously, the X7-8800 ripped through our benchmarks like armor-piercing rounds through tissue paper, and we could run games at high resolution with all the graphics features enabled. But it also proved to be a nice machine to get some work done with, provided you normally work at a desk (more on this later). The keyboard had nicely sculpted keys and good action and came with a numeric keypad. The trackpad had a distinct texture that lets you know your finger has found the right place. Displayed text wasn't too small despite the high resolution, thanks to the huge screen, and having two programs open side-by-side was no problem.

The huge screen and powerful internals confer upon the X7-8800 a size and bulk that make a mockery of the term "laptop." It's 2 inches thick when closed and weighs in at 8.7 pounds (plus another pound for its aptly-named power brick); you'll definitely be getting a wheeled computer bag for this PC. Its loud cooling fan was always running, no matter what power adjustments we made, especially compared to the Lenovo's almost silent fan.

**X7-8800**
$2,999 (as tested)
CyberPower
www.cyberpowerpc.com
●●●●

**m15x**
$4,523 (as tested)
Alienware
www.alienware.com
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On the outside, the X7-8800 looked and felt more pedestrian, rather like a no-frills appliance at a discount store. Seams were a little uneven, and some corners were even a little sharp. There's basically no external branding other than a generic-looking "Style-Note" badge, and the black aluminum screen cover picked up more fingerprints than a CSI crime scene. The power adapter doesn't engage the power jack with a satisfying click, and the faux carbon fiber trim looked like the cheap plastic it really is.

That said, these admittedly minor nitpicks probably aren't even worth mentioning given the system's value: You're basically getting the m15x's speed, a larger and stunning monitor, and good ergonomics in a (theoretically) portable package for a good $1,500 less. Han Solo said of the Millenium Falcon: "She may not look like much, but she's got it where it counts." We think this describes the X7-8800 perfectly.

## Alienware m15x

Formerly a boutique PC builder, Alienware is now the high-end gaming machine division of Dell, and its notebooks are designed from the ground up to be extremely fast, capable machines. In addition, Alienware has built up a cachet in the PC world similar to BMW in the automotive world, so to a certain extent, an Alienware PC is something of a status symbol, if not a lifestyle choice.

Our m15x had core components similar to the X7-8800: a 2.8GHz Core 2 Extreme, an GeForce Go 8800GTX, 4GB of RAM, and 802.11n. The extras were also similar, with the m15x boasting three USB ports, one FireWire port, one Ethernet jack, and SD and ExpressCard slots. The m15x's HDMI-out port trumps the X7-8800's DVI-out, however, so as to better view Blu-ray movies from the BD/dual-layer DVD optical drive. Its 15-inch widescreen display had the same 1,920 x 1,200 resolution as the X7-8800's 17-inch screen. This made the m15x a lot more portable and lighter (you wouldn't think a couple inches and a single pound make that much of a difference, but it does), but it made text a little small a times. Fortunately, the resolution is fine enough so that larger, antialiased text looked great.

The m15x just screamed "Look at me!" and would be well-suited as a prop on the set of the next "Mission Impossible" movie. All the keys are backlit with a cool blue tint, and the trackpad and display are both outlined with neon-like illuminated ribbons. The alien head logo rests above and doubles as the power button. Its eyes also flash during hard drive access, while a larger, backlit alien head covers the outer shell in place of a manufacturer's tag. The outer shell is a smooth, glossy silver plastic that resembles something from an aerospace manufacturer, yet it hid fingerprints well. Unfortunately, this same surface covers the trackpad and made it impossible to locate by touch alone.

Sharing internals with the X7-8800, it's no surprise that the m15x benchmarks were about the same. The difference in noise, however, was dramatic: Even under full load, the m15x's fan remained a loud whisper instead of the X7-8800's hoarse roar. At idle, it was as quiet as the Lenovo. The keyboard left a little to be desired, with the keys feeling slightly mushy, but they're well-sculpted, and of course, highly visible when the lights are low. The trackpad's mouse button felt very satisfying, however.

Alienware included a lot of extras. The optical drive lives in a hot-swappable bay, where you can add a second hard drive for more storage or a second battery for more portability. In-box swag includes a huge mousepad, an Alienware baseball cap, and a neoprene "notebook sock" to transport your baby in style.

Thanks to its high performance, high style, and decent portability, the phrase "you get what you pay for" comes to mind when considering the m15x's $4,523 price tag. If you need truly mobile gaming in a machine that will turn heads even while simply booting, there's no need to look anywhere else.

## Recommendations

Each of these notebooks did a good job of fulfilling a niche in the portable computing marketplace: low-cost general-purpose, high-cost desktop replacement gaming notebook, and ultra-cost portable gaming notebook. If you need a computer that fits one of these profiles, we believe each is an excellent representative of the breed.

Recommending one as the best overall is tougher, because people's portability, power, and budgetary needs are all over the place, but we'd follow these snappy generalizations: If gaming isn't a high priority and you can only have one computer on a tight budget, the Y510 is a great choice. If you need gaming power, need to save a little money, and will only move your computer once in a great while, the X7-8800 is a good option. If money is no object in your search for performance, style, and portability, then look no further than the m15x. ▲

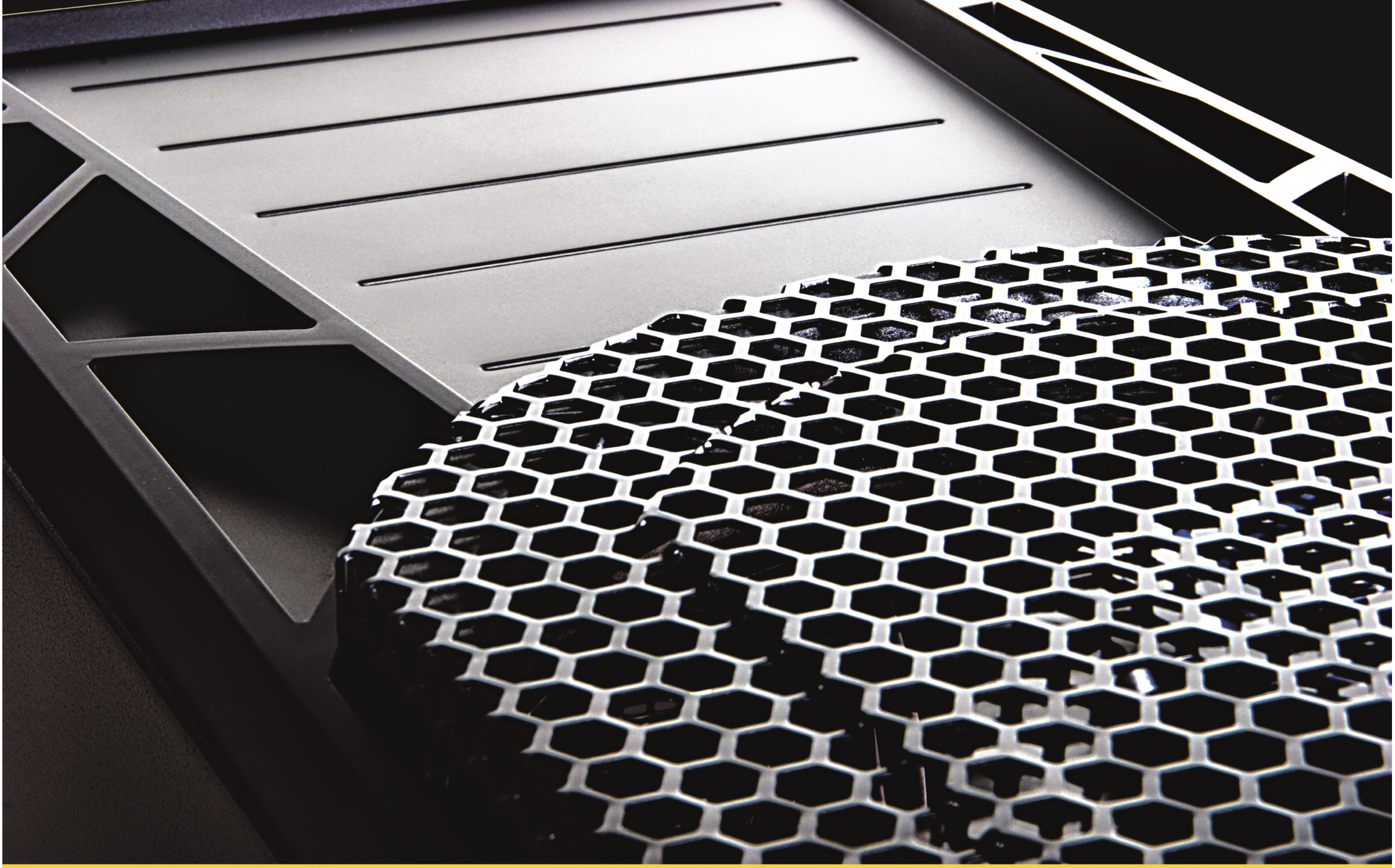
**by Warren Ernst**

## Benchmark Numbers

| | **Lenovo Y510 V** | **Alienware m15x** | **CyberPower X7-8800** |
|---|---|---|---|
| **3DMark06** | | | |
| Overall | 443 | 9235 | 9376 |
| SM2.0 | 131 | 4126 | 4175 |
| HDR/SM3.0 | 177 | 3878 | 3983 |
| CPU | 1281 | 2572 | 2576 |
| **3DMark03 3.6.0** | | | |
| Overall Score | 1346 | 30382 | 30493 |
| **Cinebench 10** | | | |
| Single-threaded time* | 9:31 | 4:49 | 4:46 |
| Single-threaded score | 1520 | 3056 | 3071 |
| Multithreaded time* | 5:07 | 2:31 | 2:30 |
| Multithreaded score | 2877 | 5834 | 5859 |
| OpenGL Benchmark | 495 | 5702 | 4859 |
| **F.E.A.R. (native resolution, details at Max)** | 12 | 31 | 30 |
| **PCMark 05** | | | |
| Overall | 3376 | 7754 | 7449 |
| CPU | 3983 | 7063 | 7033 |
| Memory | 3088 | 5224 | 5096 |
| Graphics | 1303 | 11761 | 12233 |
| HDD | 4661 | 7218 | 4577 |
| **OpenOffice 2.4** | | | |
| Writer start* | :12 | :04 | :05 |
| **Office 2007** | | | |
| Word start* | :04 | :03 | :03 |
| **Opera 9.2** | | | |
| Email start (with 500MB inbox)* | :03 | :02 | :02 |
| **Battery Life** | | | |
| Battery Eater MaxCPU (hr:min) | 1:21 | 1:02 | 1:30 |
| | | | |
| Boot time* | :56 | :59 | 1:01 |
| Shutdown time* | :09 | :21 | :14 |
| XP Drivers | Easy to find on Web site | Slightly difficult to find on Web site | Not directly available on Web site |
| DVD-ROM drive noise** | 1.5 | 4.5 | 3.5 |
| Speaker quality*** | 4 | 3 | 3.5 |
| OS | Windows Vista Home Premium | Windows Vista Home Premium | Windows Vista Home Premium 64-bit |
| Dimensions (HxWxD, inches) | 1.2 x 14.3 x 10.2 | 1.3 x 14.55 x 10.73 | 1.32 x 15.88 x 11.36 |
| Weight | 6.2lbs | 7lbs | 8.7lbs |
| Price (as tested) | $549 | $2,999 | $4,523 |
| CPU Score | ●●●● | ●●●● | ●●●● |

*minutes:seconds **Higher is quieter ***Higher is better*

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◐ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT



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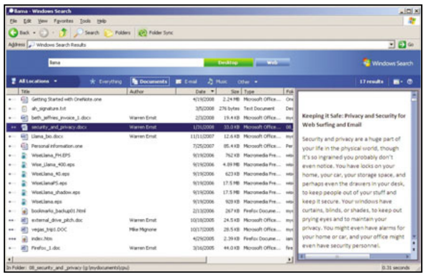
# The Bleeding Edge Of Software

## Inside The World Of Betas

## Windows Search 4.0

There is no shortage of desktop search programs, such as Yahoo! Desktop Search, Google Desktop Search, Copernic Desktop Search, and X11 Desktop Search, all of which are totally free. You might wonder why any company would enter (or re-enter) this crowded market space, but Microsoft is doing so with a reinvention of its own Windows Desktop Search, now simply renamed Windows Search 4.0.

WS, like its competition, creates an index of the contents of all your office files, emails (provided you use Outlook or Outlook Express), and graphics files' metadata, and integrates smoothly into Office 2007 (and earlier) office suites. It also integrates into XP's Search command, though the primary way to search is either with a Search field added to the Windows' Task Bar, or via a search icon in the Taskbar tray. Leave it to Microsoft to have its products integrate well with each other.



**Official Product Name:** Windows Search 4.0
**Version # Previewed:** Preview 4.0
**Publisher and URL:** Microsoft, www.microsoft.com
**Developer and URL:** Microsoft, www.microsoft.com
**Product URL:** www.microsoft.com/windows/products
**ETA:** Q3 2008
**Why You Should Care:** Microsoft swings and gets a solid hit in the Desktop Search game.

Unlike most Microsoft products, however, WS isn't especially bloated with extra features, and it's even relatively fast and resource-friendly. There's no desktop full of widgets or extra sidebars. The indexer only consumes about 20% of CPU resources when it's going through all your files, and it manages to do the job quicker than Copernic and Google in our tests. It automatically stops indexing when it detects any activity, and that works, too.

As a searching tool, it feels just a beat slower than other search tools as you're actually typing into its search field, but results still appear within a second of typing some characters. Typing into the always-visible search field merely displays a simple window with filenames and icons, while double-clicking the Tray icon displays the far-more-useful full interface, complete with document preview and file-type filter buttons. Interestingly, you must install Adobe's Acrobat Reader before WS can search and preview PDF files, but it works just fine.

Users looking for a lean, mean, resource-friendly, and well-integrated Desktop search should look hard at Windows Search, even in its Preview form. ▲

**by Warren Ernst**

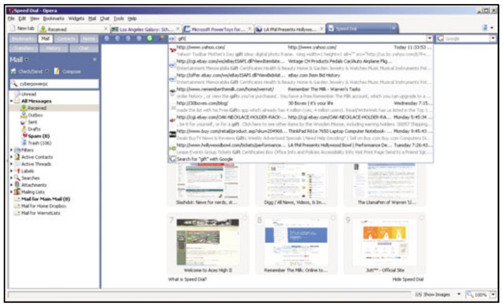
## Opera 9.52 Beta

We looked at early releases of Firefox and Internet Explorer recently, but Mozilla and Microsoft don't offer the only worthy Web browsers in beta form: The ever-plucky Opera has released a very stable 9.52 beta version, and anyone who likes to zig when others zag should install it pronto.

High on the list of improvements is speed: The beta version is significantly faster at rendering Web pages and interpreting JavaScript-based pages, and should you use the integrated M2 email client, you'll be rewarded with vastly improved performance accessing messages. The beta rewrites your mailstore files, however, so make a backup before checking out the beta. On that note, the beta automatically installs to a separate folder and uses a different Preferences file, so you can install the beta and keep using the released version at the same time.

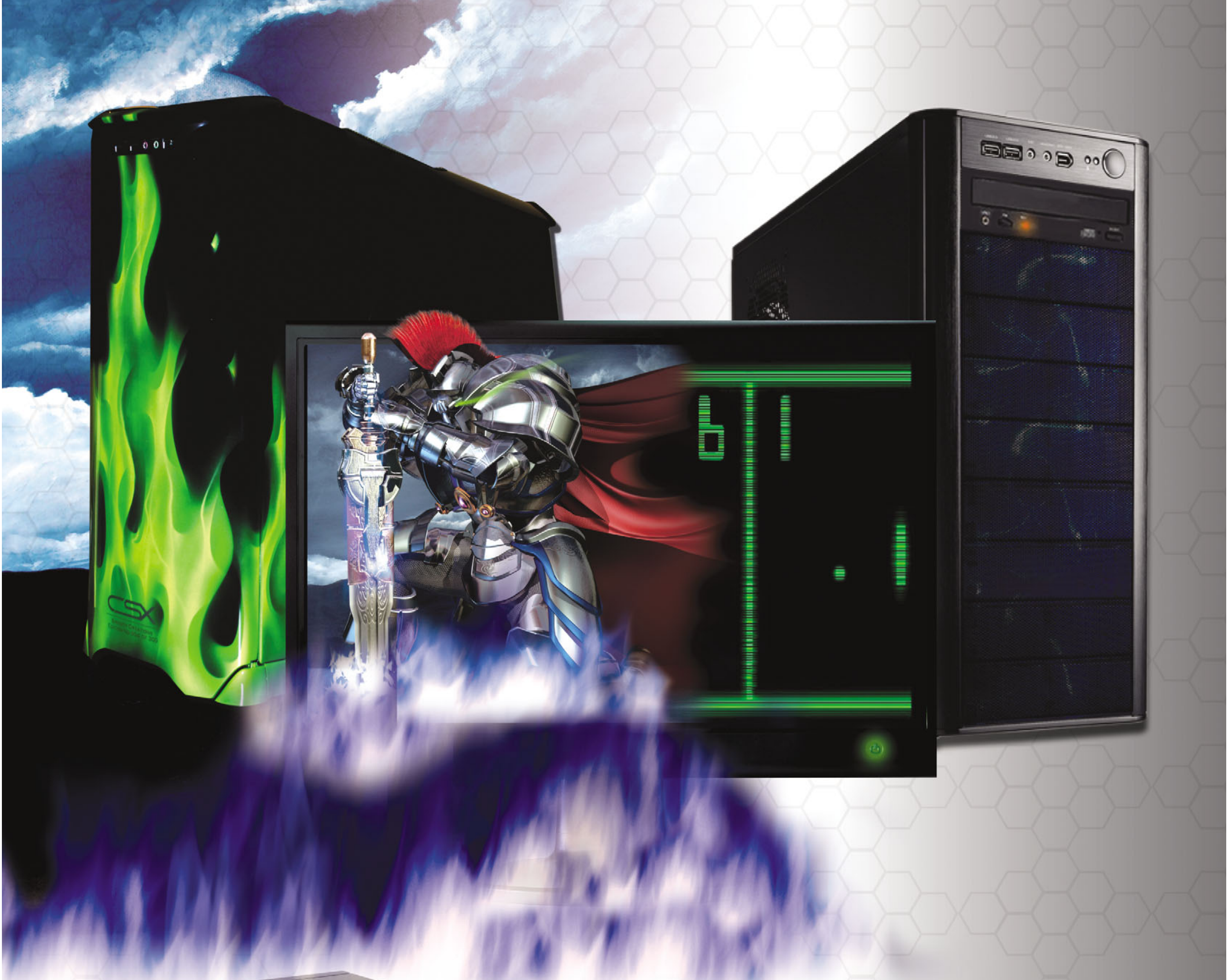
Opera usually innovates the features that wind up as Firefox extensions, and the beta introduces some new ones, too. QuickFind is a new Address Bar, and it works much like the Firefox 3.0 beta's Address Bar: Start typing part of any word you've recently seen in a Web page, and recently viewed addresses appear in a menu. Opening new browser tabs displays Speed Dial, which is a visual list of your top 10 favorite Web sites. Also built-in is a basic antiphishing filter and a Greasemonkey-like feature that allows for dynamic rescripting of Web pages.

Other than very minor visual glitches with certain themes, the latest beta seems stable enough to use daily, and so I have. ▲



**Official Product Name:** Opera
**Version # Previewed:** 9.52 Beta
**Publisher and URL:** Opera Software ASA, www.opera.com
**Developer and URL:** Software ASA, www.opera.com
**Product URL:** www.opera.com/products/desktop/next
**ETA:** Q3 2008
**Why You Should Care:** The alternative "alternative browser" gets faster and better.

**by Warren Ernst**



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# UP TO SPEED

## Upgrades That'll Keep You Humming Along

Some of our mainstays come in with new versions this month, from Firefox's almost-final Version 3 release candidate to a new version of Flash with all-new effects. Two IM clients, from AOL and Yahoo!, also seem ready for a summer of frantic teen messaging.

## Software Updates

### Adobe Flash Player 10 Beta

The pre-release version of the ubiquitous multimedia Web standard now has 3D effects, custom filters and effects, more flexible text layouts, and overall visual performance enhancements that promise smoother video playback.

www.adobe.com

### AIM Express 7.0 Beta

This latest version of the AOL IM client uses Flash technology to work on any PC desktop temporarily without having to download and install software. It provides basic IM functions to others online and to Mobile buddies via texting.

www.aim.com

### CorelDRAW Graphics Suite X4

The classic graphics and design supersuite has a fully redesigned interface, a ConceptShare feature for collaborating on projects, a new bitmap-to-vector conversion tool, and new color management tools. Training videos, a built-in handbook, and project-based instructions get you up to speed.

www.corel.com

### Earthbrowser 3.0

The interactive globe is based on the Adobe AIR platform and includes datasets that layer precipitation and snowfall onto the 3D earth. It links to live data on earthquakes and volcanoes, as well as deep information about cities, and integrates with the Web for easy bookmarking and data storing.

www.earthbrowser.com

### Firefox 3.0 RC1

As the new and much-changed Firefox browser edges towards formal launch, this release candidate polishes up all the new features. The interface is more Mac/Safari-like. Former memory handling seems to have been solved. It is more secure and faster and has better password and download managers.

www.mozilla.com

### Intel CPU Identification Utility 3.8

Intel's free tool IDs the latest iterations of its CPU, telling you the speed and system bus speeds of the multiple cores, as well as caches and features.

www.intel.com

### Maxthon 2.1.0.2082

The highly customizable browser now recalls the active sidebar from the previous session. Its built-in screen capture is set to hi-res by default. Fixes issues related to Scroll Up and Scroll Down commands and adding new Favorites.

www.maxthon.com

### OpenOffice.org 3.0 Beta

The increasingly popular open-source alternative to MS Office launches a new version that supports Mac OS X as well as the open document format ODF 1.2 spec. OpenOffice has import filters for Office 2007's new file formats.

www.openoffice.org

### Opera Mini 4.1

The latest version of the Opera full Web browser for mobile phones has text-completion for faster URL entry. The Opera servers have been upgraded for quicker site rendering. Mobile users now get the familiar CTRL-F text searching on the current page.

www.opera.com

### uTorrent 1.8 Build 10198

The popular torrent download client now adds the node age to DHT dump buckets. There are fixes here for a bug involving expired peers and DHT processing.

www.utorrent.com

### Yahoo! Messenger for Vista Beta

Long promised, Yahoo!'s IM client expressly for Vista uses a highly customizable and visual interface. Contact icons are oversized and resizable. Free PC to PC IP calls are made easy from within the client, including on-screen visualizations of the banter.

www.yahoo.com

## Driver Bay

### Adobe DNG 1.2

This is a new spec for the Adobe DNG (Digital Negative) file format, a universal replacement for the incompatible RAW formats from various camera manufacturers. This version can embed multiple camera profiles in a single image file and adds more metadata tags.

www.adobe.com

### Creative ALchemy Project 1.10.01

These special drivers and software for Creative X-Fi boards (Audigy versions also available) let the Creative Labs cards work properly with Vista to provide full EAX support from the hardware.

www.creative.com

### Nvidia GeForce 175.16

The latest drivers for many GeForce 8xxx/9xxx GPUs are WHQL (Windows Hardware Quality Labs) Certified (Windows XP and Vista versions available). It includes support for GeForce Boost and HybridPower with new cards. These drivers also add support for the GeForce 3D Stereo Technology.

www.nvidia.com

# BufferZone

Why spend all your time scanning for malware when you can keep it off your system in the first place? BufferZone provides a virtualized environment where programs and files run without having any access to your operating system.

We tested the Vista Beta 3 software, which is excellent even in this pre-release stage. It identified most of the major browsers installed on the test system including beta versions of Firefox and Opera, and the ones it missed were easy to add manually. In fact, you can add any program on the PC to BufferZone by right-clicking it and selecting the BufferZone option that appears in the context menu. For the truly security-conscious, there's a setting that automatically runs all new executable files and scripts in BufferZone, and you can also apply protection to hardware such as CD-ROM drives and USB flash memory sticks.

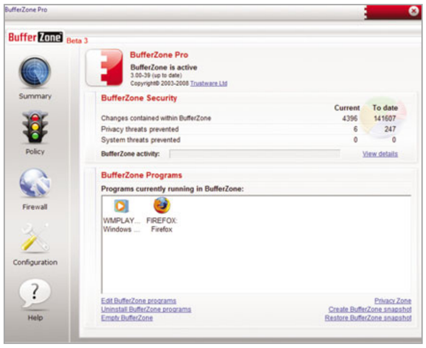
Virtualized programs display a red border when running, making it easy to know when the protection is active. Files downloaded from the Internet are stored in a virtual drive, and files that already exist on the PC are prevented from interacting with any program running in virtualized mode. The icons for all files are clearly marked to show if and how they are protected, and converting a virtual file to a normal file is trivial.

Virtualized programs take a few seconds longer to start than is usual, but once they are running, lag is minimal. Browsing the Web in the virtual environment is indistinguishable from normal browsing, and you can click links on forums knowing that whatever is on the other end can't touch your system.

The same goes for email—feel free to open any attachment, because any program you use to access it is automatically virtualized. Another nice touch is that while attachments are virtualized, the email client is not and therefore doesn't suffer from any performance penalties.

BufferZone is simple and powerful software that offers outstanding malware protection, and it provides a lot of peace of mind for the money. ▲

**by Tracy Baker**



BufferZone Pro
BufferZone is active
3.00-39 (up to date)
Copyright© 2003-2008 Trustware Ltd

BufferZone Security

| | Current | To date |
|---|---|---|
| Changes contained within BufferZone | 4396 | 141607 |
| Privacy threats prevented | 6 | 247 |
| System threats prevented | 0 | 0 |

BufferZone activity: View details

BufferZone Programs
Programs currently running in BufferZone:
WMPLAY... Windows ...
FIREFOX: Firefox

Edit BufferZone programs
Uninstall BufferZone programs
Empty BufferZone
Privacy Zone
Create BufferZone snapshot
Restore BufferZone snapshot

**BufferZone**
$29.95
TrustWare
www.trustware.com
●●●●◖

# StealthSurfer

Locking down a PC so malicious code doesn't get in and your files don't get out is tedious. StealthSurfer aims to automate that process by packing a bunch of commercial Internet security tools onto a USB flash drive so you can surf securely from any computer running Windows XP.

No proprietary software is included with this product. Instead, an OCZ Rally USB drive holds registered versions of MojoPac Deluxe for virtualization, Hushmail Premium for encrypted online email, and RoboForm Pro for password management. This is rounded out by freeware including the Firefox Web browser, Thunderbird email client, and Tor IP masking tool.

This combination of software provides a buffer zone between your PC and the Internet where neither can interact with the other but you can still directly work with both of them. MojoPac virtualizes everything installed on the USB drive, meaning viruses or malicious scripts you encounter while surfing can't touch the PC's operating system. It also provides a Desktop separate from your standard Windows Desktop, and switching between the two requires a single mouse click. RoboForm Pro is an excellent password manager. Hushmail Premium makes it easy to send and receive encrypted e-mails. Using Tor can make even a speedy broadband connection feel like a 28.8 Kbps dial-up modem, but that's a limitation imposed by the way Tor works, not StealthSurfer's implementation.

One downside to this package is that experts could put together something similar for a fraction of the price. For example, it's easy to find less-expensive USB drives, and a free version of MojoPac is available that lacks only technical support compared to the Deluxe version. Customization would be nice, as well. If you want to use PGP for email encryption instead of Hushmail, for example, there's no way to leave Hushmail out of your order.

Lack of Vista support is another bummer, but a Vista-compatible version of MojoPac is in the works and will be provided to all registered users free of charge when it is available.

If those limitations don't bother you, StealthSurfer is a nice little plug-and-play solution that is very easy to install, configure, and use. ▲

**by Tracy Baker**

**StealthSurfer**
$179 to $339
StealthSurfer
www.stealthsurfer.com
●●●

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

# Ringtone Media Studio 3

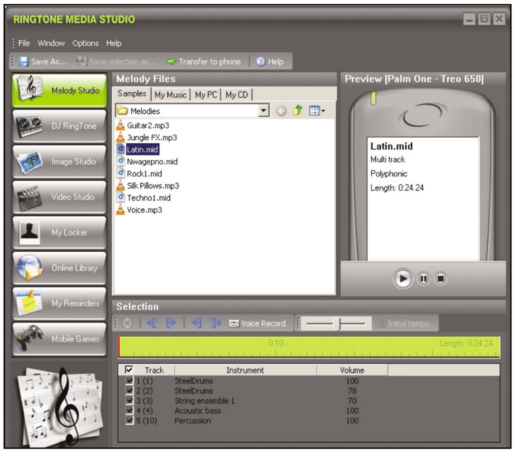
Most of us have mobile phones that are capable of playing movies, MP3 ringtones, and games, and our mobile phone companies are generally more than happy to charge us a significant fee for the privilege to take advantage of these abilities, which seems a little unfair. Ringtone Media Studio 3, however, may level the fairness playing field, allowing users willing to tinker the ability to create their own ringers and mobile movies and choose from hundreds and hundreds of others from Avanquest's library.

RMS3 starts off promising, giving you four licenses for your $29.95. It comes with a CD filled with hundreds of ringtones (both as MP3 files and as MIDI files) and automatically links to an online library with many more. The purchase price also lets you install five games (such as Poker, Block Breaker, and others) onto compatible phones, and the whole package is compatible with about 1,000 phones and all U.S. mobile services. By working with Avanquest's storage Web site and your carrier's multimedia transmission service (which you may accrue fees using), you can transfer content to your phone without cables, IR, or Bluetooth. But if your computer and phone are supported, you can use these transmission methods, too.

The "If your phone is supported" part is a big "if." Tested with two supported phones, we had varying luck transferring movies and games "over the air;" RMS3 happily allowed us to transfer a video that would never work on a Treo 650. The available trial version should help you determine how compatible your phone really is before you buy.

RMS3 allows for basic movie and MP3 editing, working a little like a miniature version of iMovie, slick and intuitive and fun to experiment with. If your phone is fully compatible with RMS3's features, then RMS3 is a good solution to avoiding your telco's extra charges for spicing up your mobile phone. ▲

**by Warren Ernst**



| ☑ Track | Instrument | Volume |
|---|---|---|
| ☑ 1 (1) | SteelDrums | 100 |
| ☑ 2 (2) | SteelDrums | 78 |
| ☑ 3 (3) | String ensemble 1 | 70 |
| ☑ 4 (4) | Acoustic bass | 100 |
| ☑ 5 (10) | Percussion | 100 |

**Ringtone Media Studio 3**
www.ringtonemediastudio.com
$29.95
● ● ●

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# NovaBACKUP 10

Generally before we list any PC tweaks for you to try, you'll hear us admonish you to back up, Back up, BACK UP!!! your system. If you're lacking a good backup program, we humbly suggest NovaBACKUP 10, which handles all the backup tasks you'd ever need with simplicity, style, and pretty good speeds, too. Though our 10.000 release wasn't completely without "fresh-release bugs," we consider it worthy of your consideration given how solid past versions have been.

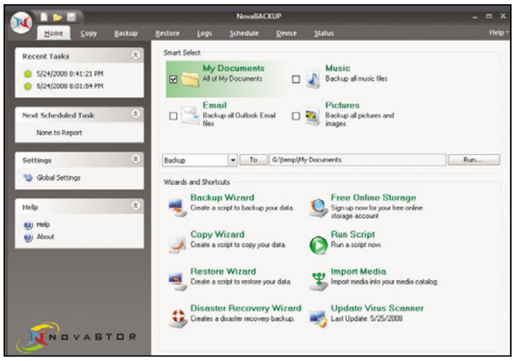
NovaBACKUP 10 sports a new Office 2000-like interface, complete with Tabs where you'd normally expect pull-down menus and a Start button where a File menu would normally be. Interfaces for typical tasks are available within each tab (such as Backup, Restore, Copy, and so forth), though common tasks get icons under the Home tab. We find the interface a big improvement over previous versions.

NB10 has all the backup bases covered, allowing everything from full and incremental backups, file copying and folder synchronizations, scheduling, and whole disk-image creation, all of which we tested and worked like a charm. Ghost-like whole drive images can deal with individual partitions, too, and it is able to make a clean drive image of the Windows partition while Windows is running and files are open, which is the neatest of tricks. Backup destinations include optical media, external USB and FireWire devices, network stores, and internal hard drives, with NB10 automatically creating self-booting, Linux-based restore discs/media when necessary. Purchasers also get one year of 2GB online storage, making for a good safety net.

Our only main gripe (which we have with many other backup tools, as well) is the use of Nova's in-house compression format, which precludes using something like WinZip to recover files in an emergency; you'll need to install NovaBACKUP again, so keep its installer handy for emergencies.

Still, NovaBACKUP is a complete and robust backup package with an inviting interface that encourages its regular use, which is really what backup software is all about. ▲

**by Warren Ernst**


NovaBACKUP
Home Copy Backup Restore Logs Schedule Device Status Help
Recent Tasks
5/24/2008 8:41:21 PM
5/24/2008 8:01:54 PM
Next Scheduled Task
None to Report
Settings
Global Settings
Help
Help
About
Smart Select
☑ My Documents All of My Documents
☐ Music Backup all music files
☐ Email Backup all Outlook Email files
☐ Pictures Backup all pictures and images
Backup
To
G:\temp\My Documents
Run...
Wizards and Shortcuts
Backup Wizard Create a script to backup your data.
Free Online Storage Sign up now for your free online storage account
Copy Wizard Create a script to copy your data.
Run Script Run a script now.
Restore Wizard Create a script to restore your data.
Import Media Import media into your media catalog.
Disaster Recovery Wizard Creates a disaster recovery backup.
Update Virus Scanner Last Update: 5/25/2008
NOVASTOR

**NovaBACKUP 10**
www.novastor.com/pcbackup/backup/n_backup.html
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by Chris Pirillo

# Narrowing Broadband

Back in the day, I had to pay $40 a month to receive 30 hours of Internet access at a blazing 28.8bps (compared to 9600 baud). Now, everything old is new again. Certain cable companies (like Time Warner and Comcast) have been considering capping the amount of data one would be allowed to download or upload over the course of a month's time. Of course, overages would yield additional charges, so it's not like they completely cut you off after a certain point. They'll cut you off at the knees, but they won't totally cut you off.

This is such a colossally bad idea. It's just . . . stupid.

My mom unplugs her radio when she's not using it just so she can allegedly save 3 cents on her monthly electric bill. The moment she hears that she *might* get overcharged for her access, she's going to stop going online altogether. As someone who isn't a hardcore Web addict, she's going to be hurt more by the FUD than those who live and die by the 'Net. With gas prices skyrocketing every hour, she's likely to view Internet access as optional. "The phone works just fine, and we're already paying for that. If we're being charged for any accidental overages that we don't realize we're incurring until we get the bill, we'll just communicate by voice. I don't want to send too many emails or I'll go over quota."

My parents finally upgraded to a laughable 130k DSL connection from Qwest, and they don't want to pay a penny more. They don't understand that sometimes you have to spend money to save money. It's almost like a Costco model, if you think about it. All they have to do is buy a few discounted items that they couldn't find locally to quickly make up the money they spent on broadband access.

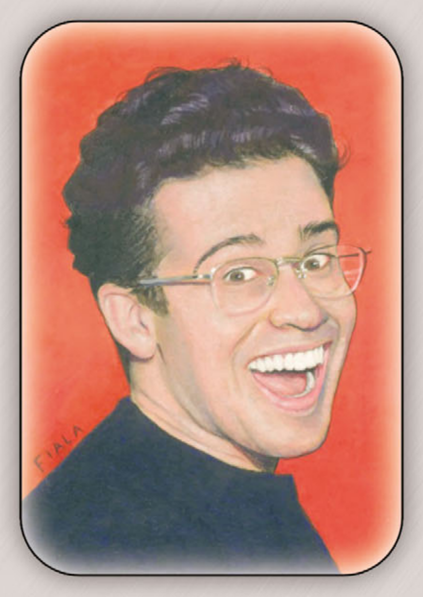
But most people don't look at the Internet that way. They don't realize that it can do much more than simply deliver sneezing panda videos and . . . Oh, better not watch too many videos this month, or you'll go over quota! Just look at ASCII art, instead.

In terms of a citizen's use of broadband, the United States generally lags (pun intended) far behind other countries. Maybe we already feel like we're being capped, and now ISPs want to add insult to injury? To what end? To halt piracy? It won't work. I'm far from a freeloader, and I'm certainly not an extreme data-use edge case. But I get quite uptight at the thought of my ISP (or any ISP) charging anything but a flat fee for bandwidth. I have a Vonage account because I was tired of getting nickel-and-dimed by the phone company (that, and I love getting my voicemail as WAV attachments in email). It's a matter of convenience and peace of mind in knowing that the bill won't be higher or lower than what my contract stipulates. Hallelujah.

As far as I'm concerned, the Internet is our generation's public library. True, you can only check out so many books when you're at the library, but what if the library started saying that I had to be careful about what kind of books I read because I might get charged extra once I've exceeded my total pages read quota? Since the Internet is the No. 1 source for information anymore, levying such restrictions against customers would only serve to hinder personal growth and the pursuit of information.

There's already enough worry going on in terms of what happens online; why does the industry feel the need to make things worse for those who don't know any better? Maybe they think they're doing the right thing, and they're likely feeling pressure from special interest groups who still don't understand that users are really in control.

The Internet isn't in beta. You can't give users unfettered access to something, only to restrain them later. I would much rather pay twice as much for an "all-you-can-eat" plan than half as much for a "pay-as-you-go" plan. Of course, with paying more, I'd expect to receive speeds that rival those in South Korea. ▲



*Chris Pirillo streams his life online at live.pirillo.com. Having recorded over 1,000 videos in the past year, he has cracked the Top 100 most subscribed on YouTube. Over 5 million unique live video viewers have watched him do his thing—a total of over 2 million viewer hours with an average viewing time of 25 minutes per visitor. This, of course, is being done in conjunction with his blog at chris.pirillo.com and with his blog network at lockergnome.com. If you want to see what all the fuss is about, why don't you just stop by and say "Hi"?*

**You can dialogue with Chris at**
**chris@cpumag.com**

## Open Sauce

by Pete Loshin

# Little Things Mean A Lot

Software invariably surprises. Did you ever imagine it would be so fast/slow/big/small/easy/difficult? I'm obviously biased, but open-source surprises are usually the nice kind. After all, expectations tend to be low when you've invested so little (as in nothing) in the price of the program. Oddly, some of the nicest open-source surprises are also small—nice flourishes rather than earth-shatteringly awesome. I'm not going to start with the kind of surprises I get from proprietary software, but (again, for me) they are usually big and not-so-nice.

Consider Aero and its open-source counterpart, Compiz (compiz.org). Both offer shiny new GUI features, such as 3D animation. Both have significant hardware requirements (compared to earlier generations) to run usefully. There are also little things, like little programs to help figure out whether your system actually can run Compiz, or Vista with Aero.

Microsoft offers Windows Vista Upgrade Advisor, a 6.6MB download that requires 20MB of free disk space and runs on any 32-bit version of Windows XP or Vista (except Enterprise Edition). But not Enterprise Edition. You'll need to run it with Administrator privileges, and you'll need .NET 2.0 and Microsoft Core XML Services 6.0. If either of the latter two components is missing, you'll get a handy link to download them.

On the other hand, to see if your PC can handle Compiz, just download Compiz-Check (forlong.blogage.de/article/pages/Compiz-Check), an under-20Kb script that sets up and runs in about a couple of minutes with Synaptic, which happens to be the estimated download time for Microsoft's Vista Upgrade Advisor (over fast broadband).

Let's look at browsers. Sure, Microsoft finally implemented tabbed browsing in Internet Explorer, but Firefox is still the better browser. If you like searching the Internet, that is. I love the Search bar. There's a nice default selection of search engines, to which I can add my own favorites. Then, I discovered I could type search terms directly into the Location bar and either go directly to the "right" page (really just an "I'm Feeling Lucky" search, in that Google just redirects you to the Web site that its search algorithm returns as the highest-ranked page), or else go to the Google search results for that search. Pretty nice, right?

I'm not done, though. Firefox lets you assign Smart Keywords (mozilla.org/products/firefox/smart-keywords) for your favorite search sites. Instead of navigating to your site, opening the search form, and entering your search, type the keyword and search terms into the Location bar, and Firefox takes you directly to results. It works for any page with a search field: the Internet Movie Database, Google Maps, Amazon.com, even my local library system.

You may be thinking, "Well, you've got to do a lot of typing to use something like that." Which brings up one of my favorite (and oldest) Linux/UNIX features: highlight to copy, middle-click to paste. It works across just about every application, from the command line to email to office applications, and it's just *so* handy. In Windows, you've got to highlight the text, press CTRL-C in the source application, mouse to the target application, and press CTRL-V. The first time I used this feature was to copy a Linux command from a Web site into a command-line session. Wow!

I could go on, but that's because I use open-source software all the time and have come to appreciate all those nice little touches. I'm sure there are similar nice features built into proprietary software, right? In fact, if your software (closed- or open-source) has a favorite feature, please pass it along to me at pete@cpumag.com. I'll share the best in a future column.

But the big question is this: Why is open source so pleasantly surprising so often? The main reason is this: Microsoft is the only entity that can add core features to Internet Explorer or Office (for example), no matter how great they would be. And I'm not talking about plug-ins, either, which can complicate upgrades. No matter how easy the feature would be to add, anyone can (and will) add it to Firefox or OpenOffice, respectively. ▲

*Pete Loshin publishes LinuxCookbook.com, a place to learn even more about Linux. And don't forget to check out the new Ninitata.com, Pete's family-friendly fun and learning site.*

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**You can get saucy with Pete at pete@cpumag.com**

# Booting Up Blockbusters

## Film Rentals Now Playing On A PC Near You

Someday soon, trips to the video store may seem as quaint as milk deliveries, black-and-white TV, or video arcades. We may be telling our grandkids about "hard childhoods" of actually piling into the family car and driving to the nearest shopping center to retrieve that latest Pixar film. "Gee, Grandpa, didn't you have Blockbuster and Netflix already available on your wall-sized OLED video screen?" the little tikes of the future may ask.

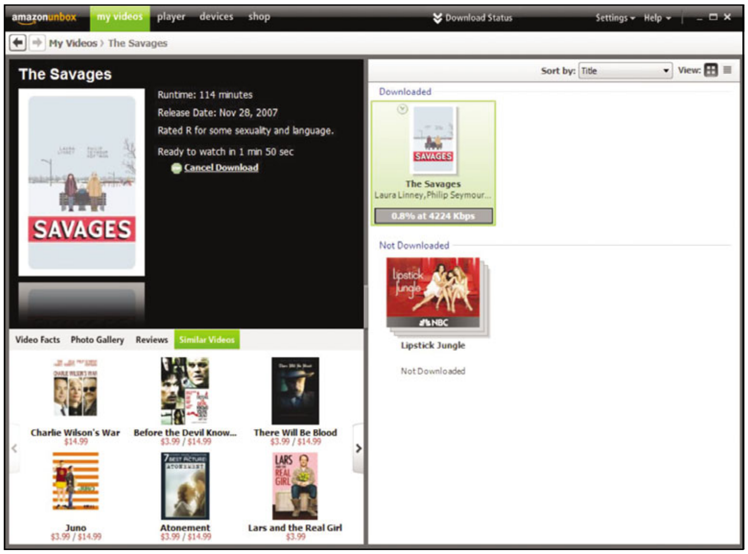
No, kids, we may be years away from super-sized, hi-def OLED wall installations, but the age of digital film downloads is fast approaching . . . and the big video rental companies know it. At a recent investor meeting, Netflix CEO Reed Hastings admitted that his mail-order DVD rental business likely would "peak" within the next five years. "Our key challenge is growing earnings per share and subscribers while funding streaming [online video], which should give us years of subscriber and earnings expansion." Netflix's archrival in the bricks-and-mortar and mail-order rental world, Blockbuster, sees the digital writing on the wall, as well. The company purchased online film store MovieLink and is experimenting with direct downloads of movies to portable devices from kiosks in the store.

Almost everyone in the media business agrees that digital distribution of film content is the inevitable future. In fact, some industry observers wonder if the recent victory of the Blu-ray hi-def DVD format war will end up being pyrrhic. Yankee Group analyst Mike Goodman said recently in a company report on the industry, "Blu-ray has won one battle, but they've gone straight into another one—one that is going to be much more difficult for them to overcome and that is going to have an impact on their business, because consumers are embracing digital distribution."

While cable companies have been offering various flavors of VOD (Video On Demand) services over set-top boxes for years, the online digital film scene offered a stark choice between poor selection (grade Z horror and Kung Fu flicks) and piracy (P2P downloads of illegally-trafficked titles). Hollywood was terrified at the prospect of legal, digital versions of its core A-list properties floating around the Internet like so many ripped CDs. The idea of renting recent releases for direct viewing over the Internet seemed more like another long-delayed futurist scenario. But in early 2008, Steve Jobs and the mighty Apple juggernaut helped bring the future that much closer. The launch of film rentals direct from iTunes represented a radical shift in Hollywood policy towards the Internet, and not just for Apple. Many of the major studios had agreed to allow recent-issue films to be downloaded and viewed for a limited time on PCs. In addition to iTunes, Amazon's UnBox, longtime digital film store CinemaNow, and Blockbuster's own MovieLink service offer a similar menu of hundreds of titles. As of this writing, for instance, "Juno," "Alvin and the Chipmunks," and "The Golden Compass" were available for rental on one or more of these services for $1.99 to $3.99 within weeks of their DVD release. And in many cases, users could buy the digital download version of the film (usually for $14.99) on the same day and date the disc arrived in retail stores.

### The Real Deal

In testing and reviewing all of the major digital film rental services (iTunes, UnBox, CinemaNow, and MovieLink), we are pleased to report that the user experience actually is quite good. Because of DRM (digital rights management, see below for more), all of these services require that renters use the company's own dedicated video player for



Runtime: 114 minutes
Release Date: Nov 28, 2007
Rated R for some sexuality and language.
Ready to watch in 1 min 50 sec

Amazon's UnBox player software offers the richest experience for film buffs, with tons of background information, stills, and recommendations.

playback. Apple has its own proprietary DRM, but the others rely on versions of Windows Media formats. You choose a film for rent from the growing online catalog, and the film begins downloading to the player. Apple iTunes and Amazon will charge your existing account. MovieLink and CinemaNow will use a credit card or PayPal. In most cases, the file size is between 1GB and 1.5GB and delivers a data stream of about 1,500Kbps. In our tests, download times for the full films took about half an hour. But the beauty of all these players is that they will begin playback within two to three minutes of initiating the download, which continues in the background while you watch the film.

We tested several movies and services, including "Yuma" on CinemaNow, "The Simpsons" on UnBox, and "Sweeny Todd" on iTunes, and we were able to start viewing the rental within minutes and watch the film continuously without a single buffering delay or hiccup. On a large PC display, the video quality was something less than a standard DVD but still very watchable, with good sharpness and detail in the images. The audio also sounded clean. In fact, in trying some of the same films across different rental providers, we saw no discernible difference in playback quality. The players let you stop, restart, rewind, and fast-forward the films from any given point.

Each of the players and services also comes with some special features. Apple clearly benefits from its full suite of devices and platforms. Apple rentals can be pushed from the PC to most video-capable Apple devices, such as iPods, iPhones, and Apple TVs. Because of studio restrictions, films cannot be synced to co-exist on more than one device. In the iTunes software, users elect to move a film to one of these other devices so it plays back only in one place at a time. We were able to start watching a movie on our iPhone and then push it back to the PC to finish watching it there. In mid-winter, Apple also upgraded its Apple TV service so that a set-top box connected to a TV now communicates directly with the online iTunes store. The added value here is that Apple TV users can rent many films in higher-resolution HD versions for a dollar more than the standard-def version. While not quite as sharp as Blu-ray versions of the same film, we found the HD versions visibly superior to standard-definition video on a large screen.

For its part, CinemaNow brings to the mix an interesting library of more obscure and cult favorite titles. But the company also has a CinemaNow Mobile component that is unique. Members can browse and rent films from a mobile Web page on their phones, and the movie automatically downloads to the

## THE NEXT FLICKS?

Also competing in the set-top video rental space is the upstart Vudu (www.vudu.com). Much like Apple TV, Vudu sells a set-top box ($295) and then lets you pay as you go for both standard def and HD rentals at up to $5.99 each. It claims 5,000 movie and TV titles in its database of offerings and an interface and search feature that is getting wide praise.

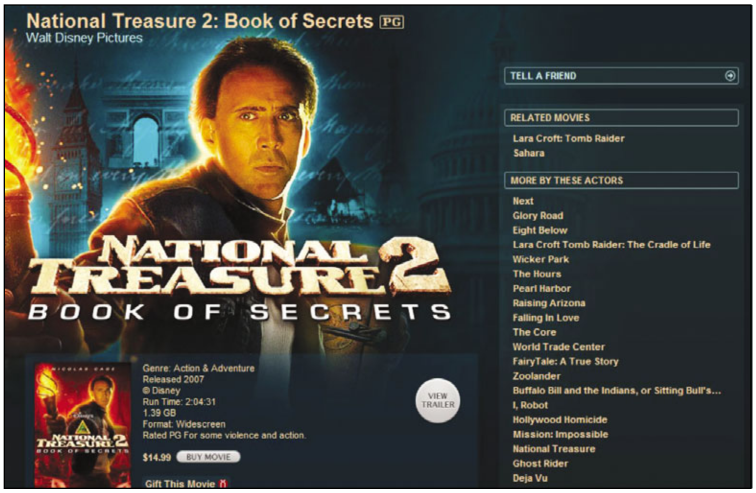
Netflix, the company that helped rattle the cage of traditional retail rentals, is not waiting for the digital distribution revolution to pass it by. NetFlix started shaking up the film rental market years ago, forcing Blockbuster to open a mail-order service of its own. While NetFlix does not have a la carte digital rentals like iTunes and UnBox does, it is cooking up another solution that employs streaming. For its monthly subscription customers, NetFlix offers a very limited library of Watch Now titles that can stream to the desktop via the browser. The Watch Now tab at the Netflix store can start a film in medium resolution within seconds. In a new twist, Netflix partnered with a hardware company to issue a small set-top box dubbed Roku. The Roku connects to the Netflix service to stream the Watch Now library to TV screens. What is novel about the Netflix approach is less the technology than the business model. The company seems to be moving towards a subscription-based approach to digital rentals that combines its mail-order model with the emerging IP-based delivery system. ▲

CinemaNow movie player on a designated laptop or desktop PC. Amazon's UnBox movie player is by far the most robust in terms of information. It provides deep background, stills, and related content around the film you are viewing and leverages the massive Amazon recommendation engine to suggest others. UnBox also allows transfers to select non-iPod portable players.

## The Big Catch . . .

You knew there would be one; It's the severe playback restrictions placed on digital rentals. Hollywood studios only agreed to the new model for digital film rentals after Apple and Windows Media file formats proved themselves capable of enforcing very stringent flagging and tracking of content to prevent piracy. In general, these rentals work only with the specific media player provided by the vendor. From the time of renting the film, the download is good for playback for the next 30 days. But once a user initiates playback of the film, he has only 24 hours in which to finish viewing it. Hollywood studios not only hope to prevent piracy with the new digital distribution system, but they also want to avoid conflict with their other proven channels. By keeping a 24-hour viewing window on digital rentals, and by releasing most films to this channel weeks later than the DVD release, the film industry wants to maintain some distinction between release windows and formats in which consumers can watch a film.

The rental restrictions also introduce to video playback a new layer of DRM complexity. While Apple and Microsoft do not go into any detail on how their protection schemes work, DRM experts say that time-constrained rights management of files is a new game for some of these companies. In early 2008, the introduction of digital rentals from Apple required an upgrade of the iTunes store, the QuickTime player, and iPod firmware in order for all to handle the new restrictions properly. Apparently, once a rented film starts playback even on a disconnected device, it relies on some sort of internal countdown clock to determine when the 24-hour playback window has expired.



National Treasure 2: Book of Secrets PG
Walt Disney Pictures

Genre: Action & Adventure
Released 2007
© Disney
Run Time: 2:04:31
1.39 GB
Format: Widescreen
Rated PG For some violence and action.
$14.99

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The Core
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Zoolander
Buffalo Bill and the Indians, or Sitting Bull's...
I, Robot
Hollywood Homicide
Mission: Impossible
National Treasure
Ghost Rider
Deja Vu

Not quite ready for rental. Many new DVD releases continue to spend their first few weeks online as purchase-only films.

## Ditching The Disc?

Ultimately, the success of digital film distribution depends on consumer acceptance of a disc-less world. The music industry once argued that CDs were here to stay because consumers want to purchase a tangible product, not just some track sitting on a hard drive. But as of this year, Apple iTunes is now rivaling Wal-Mart as the leading seller of music in the U.S. A wired world is changing attitudes and buying habits.

Clearly, Hollywood studios are trying to enter the digital world deliberately and avoid the market crash that digitization brought to the music industry. And so in these early days of online rentals, the studios are manipulating the release windows. Most films still come to online rental a few weeks after their DVD and digital purchase releases. For instance, movies such as "Juno," "There Will Be Blood," and "National Treasure 2" were available to buy outright on the day and date they came to bricks-and-mortar stores for rental, but the online rental option only went live weeks later. And the overall selection remains a bit sparse, even compared to physical stores. By mid-spring, fewer than 500 titles were available for rent on iTunes.

Until consumers get the same selection at the same time online as they do in retail stores, then the online rental model will remain a bit more "virtual" than "real." ▲

**by Steve Smith**

**Infinite Loop**

## Minnesota Town Tells Google To Get Lost.

If you access Google's Street View service, you can get a ground-level view of a lot of cool places around the country such as the Golden Gate Bridge or Times Square in New York City. Google's been expanding its Street View service by taking photos in towns all over the map. But the residents of North Oaks, Minnesota didn't like Google snoopers posting photos of the local scenery and told Google to stop hosting the images online. Google agreed, so North Oaks remains a peaceful and very private community.

www.informationweek.com/blog/main/archives/2008/06/north_oaks_minn.html

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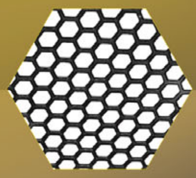
| **DC Output** | **500W** | **500W** |

Note : In order to generate 500W of energy, Seasonic PSU only needs 595W of AC input compared with other non-80Plus certificate PSU that needs 735W of AC input. In short, choosing Seasonic PSU will save you 140W just right there!

Seasonic Blue Badge

Advanced Circuit Design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WWW.SEASONICUSA.COM

Seasonic® Since 1975

by Rob "CmdrTaco" Malda

# design.txt

I've been thinking a lot about good Web page design and how irritating it is to read Web sites built with the advertisers' needs coming before the users' needs.

To be fair, I run a commercial Web site myself, but I think it's critical that you strike a balance between the commercial needs and the user needs. To these ends, I am creating my own 10 Commandments of Web user interface design. Follow them and show respect to your readers, their time, and their monitors.

I Thou shalt not needlessly subdivide pages with little or no content into tiny little nuggets of data requiring the reader to click a dozen times to get only a few hundred words of data per page. You can get away with it, maybe, if you have many huge graphics, but 1,000 words fit just fine on a single Web page.

II Thou shalt not require a reader to watch an ad in an interstitial page before getting to any content. You can put your ad on the same page as your story just like everyone else.

III Thou shalt not open an ad that covers up content, requiring a click to hide it.

Thy readers deserve to read your content by merely scrolling down the page.

They shouldn't have to play a real-time strategy game just to read your words.

IV Thou shalt not play audio into your users' Web browsers without first requiring a click, so that your users who have babies, sleeping spouses, or co-workers do not arouse the wrath of those around them merely by clicking a link that unfurls a barrage of terrible noisy hell.

V Thou shalt not attempt to obscure advertising under ridiculous names that might conceivably be interpreted by your Web site visitors as anything but paid advertising. There is no such thing as "Advertorial Content." If it is written by an advertiser, it is an advertisement.

VI Thou shalt not force a reader to create a user account in order to read your content. I know your words are interesting and divinely inspired, but the Internet was not built by fencing off the good stuff.

*Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.*

VII Thou shalt not employ moronic SEO tactics to thy Web pages. You don't need giant blobs of tag clouds, endless meta tags, and so forth. Your content should stand on its own two feet. Search engine indexes are pretty good, and your attempts to "optimize" are slimy. No, really.

VIII Thou shalt not resize thyself. Your readers have many windows on their Desktops, and they have them positioned and sized how they like them. If you choose to change these dimensions, you deserve a rash.

IX Thou shalt control thyself when thou wants to add zillions of little badges to submit a page to a Web site. Slashdot is OK. Maybe two or three more, but every one of those little images adds user latency, and those milliseconds really add up.

X Thou shalt always think about thy anchor text. "Here" is a terrible link. You don't need to link things we already know such as CNN or Google, but you should link obscure stuff. And if you reference a document as a source, you should link that, too.

So, that's it. Follow these 10 Commandments and make your gods or goddesses happy. Next time, we'll talk about how god is hungry and wants a sandwich and beer. ▲

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**Contact me at malda@cpumag.com**

# ROAD Warrior

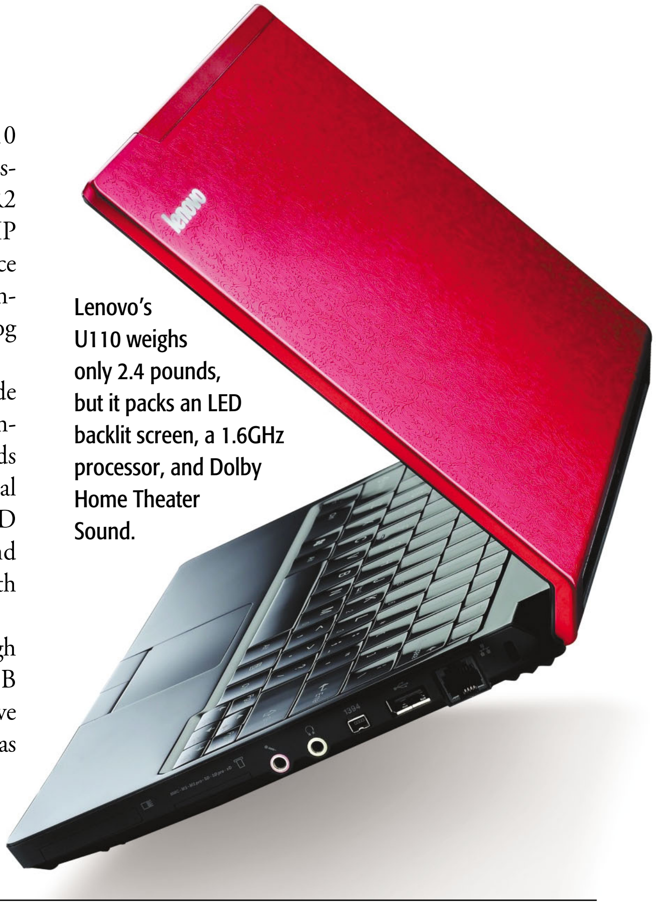
by Jen Edwards

## Lenovo Introduces Stylish, Small Tablet

The latest entry in the ultraportable tablet market is the IdeaPad U110 from Lenovo, which features a 1.6GHz Intel Core 2 Duo L7500 processor and a backlit, 11-inch, WXGA LED backlit display. 2GB of DDR2 RAM and a 120GB hard drive are standard features, along with a 1.3MP camera, which is integrated into the top of the display. Lenovo's VeriFace 2.0 facial recognition software works with the camera to secure your computer; it even records the faces of any unauthorized person who tries to log on to your computer.

The top cover of the system (available in either red or glossy black) is made of an aluminum alloy with an etched design for a variegated look. The computer measures 10.8 x 7.7 x .72 inches (HxWxD) and weighs 2.4 pounds with a 4-cell battery. (Lenovo also includes a 7-cell battery at no additional charge.) It also has three USB 2.0 ports, a FireWire port, a 6-in-1 (SD/SD Pro, Memory Stick/MS Pro, MMC, xD) card reader, and mini-PCI and Express Card slots. 10/100 Ethernet and Wi-Fi are standard, and Bluetooth is an option available on certain models.

Dolby HomeTheater sound enhances the media experience, and although the IdeaPad U110 doesn't have a built-in optical drive, Lenovo includes a USB dual-layer CD/DVD recordable drive. The Multimedia Control Center above the keyboard offers "hidden" touch controls for various multimedia controls, as well as user-definable keys. The IdeaPad U110 ships with Windows Vista Home Premium and is available for $1,899. ▲



Lenovo's U110 weighs only 2.4 pounds, but it packs an LED backlit screen, a 1.6GHz processor, and Dolby Home Theater Sound.

The new HTC Touch Diamond features the TouchFLO 3D interface and 4GB of storage for music and media files.

## HTC Breaks Tradition With Touch Diamond

The Touch Diamond from HTC is something of a departure for the company: Most of the company's handsets are aimed squarely at the business sector, but this device, is designed to be stylish and powerful, yet eminently pocketable. It measures 102 x 51 x 11.33mm (HxWxD) and weighs less than 4 ounces.

The Touch Diamond is designed to have the perfect balance between form and function. Based on Windows Mobile 6.1 Pro, the handset features a 2.8-inch VGA touchscreen, which uses the company's proprietary TouchFLO 3D interface. Some of its features may be familiar to iPhone or iPod Touch users, as the Touch Diamond lets users pan and zoom Web sites. The Touch Diamond also includes a tilt sensor that automatically adjusts the orientation of the display when necessary.

The Touch Diamond works on the 900/2,100MHz WCDMA band and supports both 7.2Mbps HSDPA and HSUPA. Bluetooth 2.0 with EDR and 802.11b/g are also included. The 3.2MP camera supports video calling and, according to HTC, has integrated GPS capability. The phone is quite roomy, too, with 256MB of flash memory for application storage, 192MB of RAM, and 4GB of internal storage for documents, photos, music, etc.

The 900mAh battery is rated for four hours of talk time and 300 hours of standby when the device is used with a GSM network. (The standby time drops to 100 hours if the push email feature is enabled.) It's currently available in Europe and will launch in the United States during the second half of this year. ▲

## Fuel Cells Ready To Invade Your Mobile Life

MTI Micro (www.mtimicrofuelcells.com) has recently shown two prototype fuel cell designs and is actively seeking to bring new innovations to the mobile device market. MTI Micro unveiled the Mobion camera grip prototype during the International Hydrogen and Fuel Cell Expo in Tokyo. Designed to work with digital SLR cameras, the fuel cell prototype is capable of providing twice the power of traditional exterior power packs. It also has the advantage of instant reuse when refilled with methanol.

At the International Small Fuel Cells conference in Atlanta, the company displayed a working prototype of its new Mobion internal fuel cell for GPS devices. It is able to power a GPS unit with a large, color screen for up to 60 hours of continuous use. Like the camera grip prototype, a depleted cell can be refilled with methanol and reused immediately. The prototype also includes a USB port that lets other small devices such as phones, cameras, and media players recharge their own internal batteries by drawing on the GPS fuel cell.

Considering the new regulations prohibiting loose lithium batteries in airplane baggage, it's nice to know that methanol-based fuel cells have already been approved for carry-on bags. According to an April 30th U.S. Department of Transportation ruling, passengers will be allowed to take fuel cells and two spare cartridges into the cabin of an aircraft. MTI expects to have commercial versions of its fuel cells products available next year. ▲

## RIM Shows Off Bold New BlackBerry

The latest device from RIM is the BlackBerry Bold, a quad-band EDGE and tri-band HSDPA smartphone. Based on a 624MHz processor, it includes a color display (480 x 320 resolution), 128MB of flash memory, and 1GB of storage, as well as built-in GPS capabilities and stereo speakers. A microSD/SDHC slot provides memory expansion, a 2MP camera with video capture capability, 802.11a/b/g and Bluetooth 2.0 round out the package. The 1,500mAh battery is rated at five hours of talk time and 13 days on standby. The exterior of the smartphone is mainly black, with chrome accents and a textured back cover designed to look like leather.

Aside from the standard BlackBerry applications such as email and a personal organizer, the Bold's Web browser offers users an Internet experience that more closely resembles desktop browsers, with options to use a full-page view or a column view that allow users to choose the full desktop view of a mobile site. The media player includes an equalizer with 11 presets, and a Media Sync application lets users transfer unprotected Apple iTunes music to the Bold for on-the-go enjoyment. Other Sapplications include BlackBerry Desktop Manager, Roxio PhotoSuite 9 LE, and Dataviz Documents to Go.

Carrier and pricing information has not yet been released, but the BlackBerry Bold is expected to be available this summer. The smartphone will come with a stereo headset, charger, carrying case, and USB cable. Optional accessories include upgraded headsets, holsters, and additional backplates in a variety of colors. ▲

The BlackBerry Bold is a stylish and powerful quad-band EDGE phone with a sleek exterior that features interchangeable backplates.

## Kensington Keeps Your iPod & iPhone Powered On The Go

The latest accessories from Kensington are designed to make sure that iPod and iPhone users never run out of power at an inopportune moment. The Mini Battery Pack and Charger ($49.99) connects directly to the dock connector on Apple's iPod/iPhone, providing emergency power for 30 hours of music or three hours of talk time when you need it. A retractable USB cable connects the device to a laptop's USB port or a USB charger, and it can power your iPod/iPhone and recharge itself at the same time. The Mini Battery Pack and Charger weighs 1.5 ounces and measures 2.38 x 1.69 x .38 inches (HxWxD).

Power-hungry users might be interested in the Battery Pack and Charger ($69), which is a slightly larger external battery that connects to your device via cable. It comes with an AC adapter and USB cable with dock connector, letting you charge both your iPod/iPhone and the battery pack at the same time. It provides up to 100 hours of music playback or six hours of talk time, yet weighs just a little more than 3 ounces. Both products are available now for direct purchase from Kensington. ▲

## Hitachi Ups The Storage Ante With New Travelstar Drive

The latest Travelstar drive from Hitachi, the 7K320, is a 7,200rpm, 320GB drive designed to be very quiet but draw roughly the same amount of power as Hitachi's older 5,400rpm drives. Built-in shock protection of up to 400G (active) and 1,000G (inactive) help to protect your data from unexpected bumps. The drive's optional Bulk Data Encryption keeps sensitive files safe from prying eyes. The Hitachi Travelstar 7K320 is available now. ▲

# At Your Leisure

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest and most interesting releases in PC entertainment, consoles, DVDs, CDs, and just leisure and lifestyle stuff we (for the most part) love and recommend, read on.

## Audio Video Corner

*by Blaine A. Flamig*

$13.99
Geffen
www.weezer.com

### Weezer

Within Weezer circles, only the ultimate album could top the band's 1994 self-titled release (the "Blue Album") or 1996's follow-up "Pinkerton." Although its latest (the "Red Album") doesn't reach this summit, it comes damn close. The album's greatness comes in part from Cuomo's willingness to share songwriting and vocals chores with his bandmates. Thus, we get the somewhat unexpected diversity of "Thought I Knew," "Automatic," and "Cold Dark World." Still, Cuomo's influence dominates, and he's bitingly funny ("Pork and Beans"), nostalgic ("Heart Songs"), and gloriously scattered-brained ("The Greatest Man Who Ever Lived (Variations on a Shaker Hymn)").

$18.99
Capitol
www.radiohead.com

### "Radiohead The Best Of"

In the last 20 years, there's arguably been no better British band than Radiohead. Certainly, none has been as consistently interesting and important. So, when a band of Radiohead's stature splits from its record company of many years, said record company usually squeezes all it can from the band before setting it free. Hence, the "Best Of" album. As with most "Best Of" releases, there's nothing on "Radiohead The Best Of" that devotees don't already have. Even the extras on the Limited Edition version aren't that much of a bonus. Still, everything devotees would most likely recommend to newcomers is here, including "Paranoid Android"; "Karma Police"; "High and Dry"; "Fake Plastic Trees"; "The Bends"; and yes, "Creep." Throw in a bonus DVD and some nice packaging, and "The Best Of" is a nice primer for Radiohead's tour across the States this summer.

$22.99
New Line Home Video
www.semipromovie.com

### Semi-Pro

Will Ferrell shoots and scores! Well, sort of. As with several Ferrell flicks, "Semi-Pro" throws up nearly as many misses as makes. When Ferrell and his hardwood teammates (Andre Benjamin, Woody Harrelson, Jay Phillips, etc.) do put the ball through the hoop, the laughs are slam dunks. "Semi-Pro" finds Ferrell as Jackie Moon, player/owner of the fledgling 1970s ABA basketball Flint Tropics, which Moon is trying to make an NBA franchise. Unlike many sports flicks that have produced plenty of in-game laughs ("Slapshot," "Bull Durham," etc.), however, "Semi-Pro's" on-court scenes are mostly bricks. Scenes between Ferrell and TV broadcasters Dick Pepperfield (Andrew Daly) and Lou Redwood (Will Arnett) and timekeeper Bobby Dee (Andy Richter) are money, though. Ultimately, any Ferrell movie has at least a few scenes that are gut-busters, and "Semi-Pro" is no exception.

$28.98
New Line Home Video
www.wildwestcomedy.com

### Vince Vaughn's Wild West Comedy Show

"Wild West Comedy Show" isn't a typical Vince Vaughn film. You may have not even heard of it. Still, it's worth your time. More documentary than comedy, "Wild West" sees Vaughn packing four up-and-coming comics (Ahmed Ahmed, John Caparulo, Sebastian Maniscalco, and Bret Ernst) aboard a bus to play 30 cities in 30 nights from Hollywood to Chicago. Along the way, Vaughn sprinkles in appearances from more-famous friends, including Jon Favreau ("Swingers"), Justin Long ("Dodgeball"), and Keir O'Donnell ("Wedding Crashers"). For the comics, though, these crowds are the biggest they've performed for, and the film's heart is in watching how they grow as entertainers and people. Further, Vaughn shows himself as someone who not only appreciates his own success, but relishes in helping others obtaining their own.

See the full reviews from A/V Corner at www.cpumag.com/cpuaug08/AYL

## DVD Byte

**7/1**

Drillbit Taylor

Vantage Point

War, Inc.

**7/8**

Stop-Loss

Superhero Movie

**7/15**

The Bank Job

Penelope

Shutter

**7/22**

21

Robot Chicken: Star Wars

**7/29**

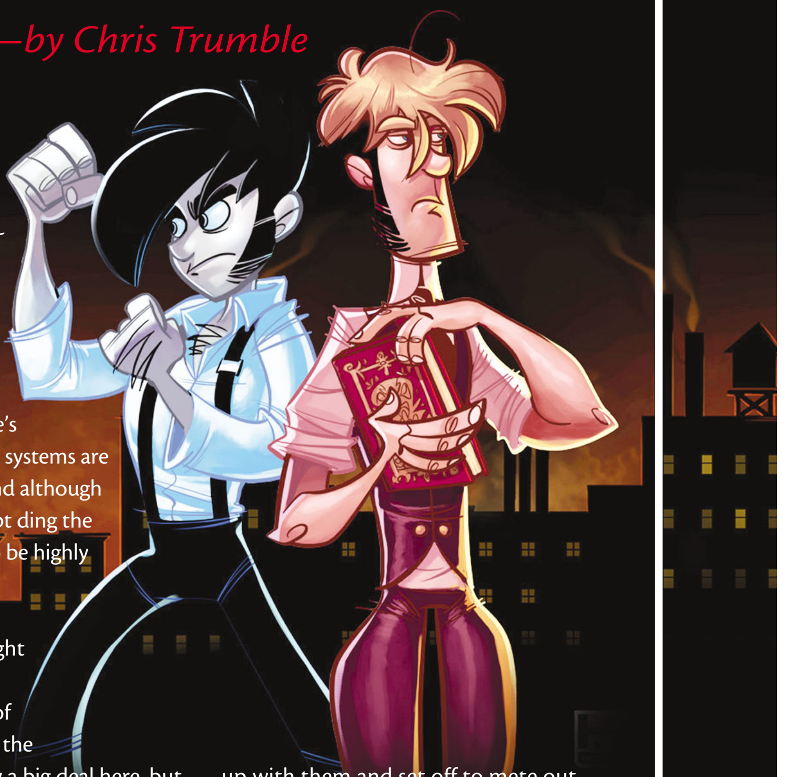
Harold & Kumar Escape From Guantanamo

Never Back Down

# ON THE RAIN-SLICK PRECIPICE OF DARKNESS EPISODE ONE

## Unadulterated Highbrow Sophmorism—*by Chris Trumble*

$20 (PC, Mac, X360) • ESRB: (M)ature • Hothead Games • www.rainslick.com



For nearly 10 years now, the Web comic *Penny Arcade* has been sharing in-jokes with the rest of the gaming world, sometimes at the expense of current game releases and sometimes of gamers themselves. Whatever the topic, though, readers can generally count on a unique blend of perspectives from characters Tycho, the sesquipedalian cynic, and Gabe, the simple yet enthusiastic potty-mouth.

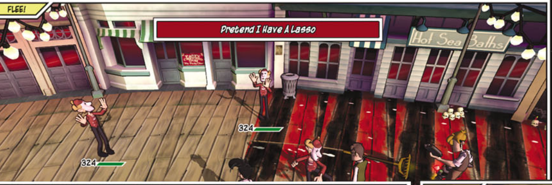
So, let's just get this out of the way now: If you've read PA and like it, you will enjoy every minute of Penny Arcade Adventures: On the Rain-Slick Precipice of Darkness. Seriously. If, on the other hand, you don't enjoy the comic, you probably shouldn't waste your time or money downloading and playing this game. That's because the development team at Hothead Games, in concert with the comic's creators Jerry Holkins and Mike Krahulik, has re-created the *Penny Arcade* experience to an almost astonishing extent.

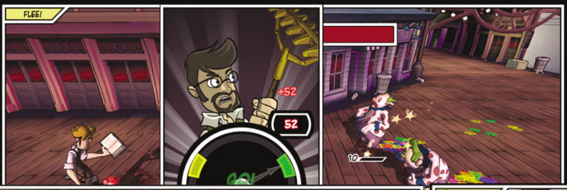
Yes, the PA duo's art and writing styles are front and center, but the PA look and feel goes beyond these obvious factors. Spend a few hours playing this game and (in addition to finishing it, more on this in a second) you will see that Hothead spent the time and effort needed to infuse even the most basic game mechanics with a strong dose of PA personality. The menu-driven, RPG-style combat is a cool blend of pen-and-paper staples ("Roll For Initiative!") and videogaming devices borrowed from countless Final Fantasy knockoffs. The game's item, inventory, and leveling systems are also immediately familiar, and although some observers will no doubt ding the game for this, we found it to be highly appropriate.

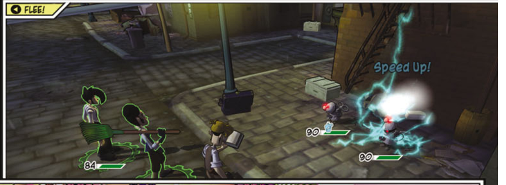
If you fire this game up expecting the PA crew to right all the wrongs of game design because they're critics of the medium, you're missing the point. The story is obviously a big deal here, but the game is also clearly a nod to shared experience among friends, just as *Penny Arcade* strips have been for years.

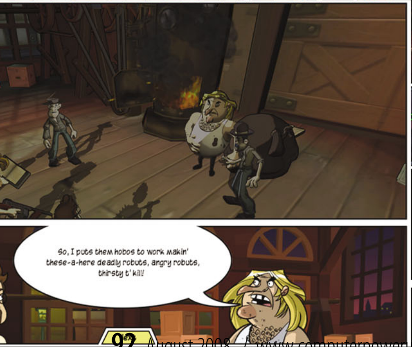
Speaking of the story, the game begins as your somewhat-customizable character has his or her home turned to rubble by a giant robot styled after a certain recurring PA character who shall remain nameless here. (Hint: It likes fruit.) As you set off along the monstrous construct's trail of destruction, you run into Gabe and Tycho, proprietors of the Startling Developments Detective Agency. You team up with them and set off to mete out rough justice, etc., and are soon caught up in a series of events that potentially have rather dire consequences.

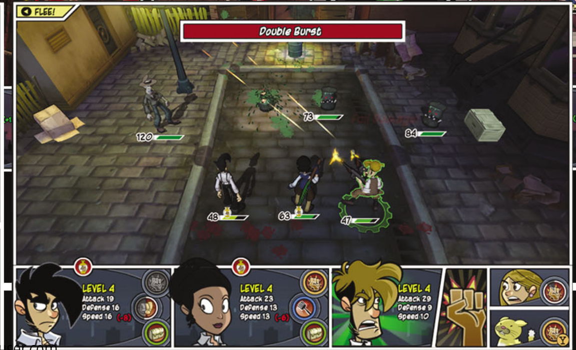
As mentioned earlier, the game is pretty short, although its price and the fact that it is part of a greater, episodic experience will somewhat ameliorate the disappointment you'll feel when the curtain falls. Then you'll realize you've paid three times as much for games every bit as short as this (and half as much fun), and you'll smile as you settle in to wait for Episode 2. ▲

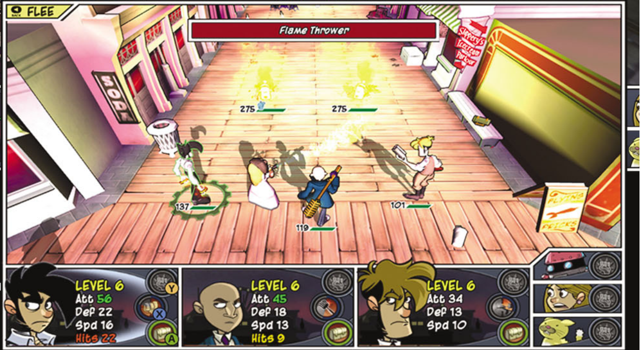







So, I puts them hobos to work makin' these-a-here deadly robuts, angry robuts, thirsty t'kill!





# HAZE™

## I Can See Clearly Now—*by Dr. Malaprop*

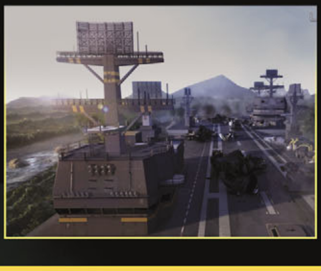
$59.99 (PS3) • ESRB: (M)ature • Ubisoft • www.hazegame.com

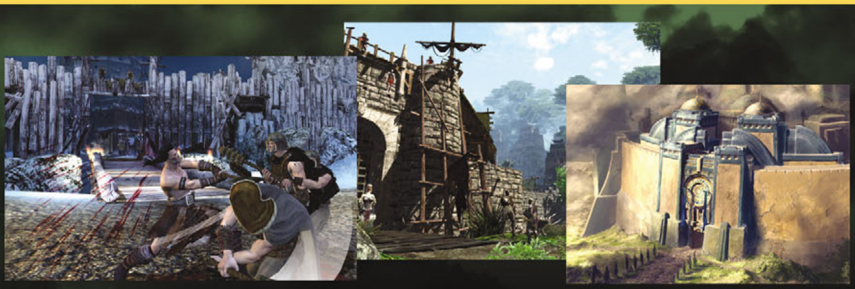
In a marketplace filled with action games, such as Call Of Duty 4, Resistance: Fall Of Man, Rainbow Six: Vegas 2, and Assassin's Creed, it's interesting to learn of a high-concept first-person shooter where the armed conflict between the hired-gun Mantel Global Industries and Promise Hands rebels raises real-life issues with conflict and drugs.

These two factions square off against each other in South American territories, and we quickly discover that the Mantel troops are supplied with a "medication" known as Nectar. By juicing up on Nectar, the Mantel troops gain improved senses and reactions. Suck down too much Nectar as Shane Carpenter and Mantel troops will go haywire and suffer adverse affects detrimental to your in-game performance (for example, turning on each other).

Without revealing a major plot twist, you will stop using Nectar in the game, and your manipulation of the drug on enemies will provide some light strategic gratification in combat. Unfortunately, the game hampers its own concept with terrible voice acting and stereotypical future marine cut-scenes.

The end result is a game that never really fulfills what was promised. And to do that in such a competitive marketplace doesn't provide Haze with legs. We're not sure why Haze was promoted so heavily by Sony as a PS3 exclusive when clearly Ubisoft has other spectacular games (Assassin's Creed, for one) in its arsenal. The fact of the matter is that Haze is not an awful game, but it's also not near the cream of the crop. It's probably most recommended for FPS fanatics; the rest of you can rent. ▲





# AGE OF CONAN
### HYBORIAN ADVENTURES

## Promising First Steps—*by Chris Trumble*

$49.99 (PC) • ESRB: (M)ature

Funcom/Eidos • www.ageofconan.com

Yes, it is early to review an MMO experience like Age of Conan, but if you're trying to decide whether to get in, you don't want to wait for countless patches and an expansion or two for a tip on what to expect when you pull the trigger. So, how good is it? In short, it's off to a pretty good start, but there's some room for improvement.

On the plus side, the game looks great and presents players with a whole new world to discover. Conan's lush, photo-realistic graphics are a step up from current MMO offerings, thanks to an updated version of Funcom's DreamWorld graphics engine. Characters and environments are crisp and very realistic, and spell effects look fantastic. The game also provides a novel gameplay element in the form of its combat controls, which let you execute attacks in real time with corresponding key presses.

On the unplus side (depending on your point of view), Conan's slick look demands a pretty stacked system to produce the desired result, while the competition runs on some integrated graphics chips and looks fantastic on middle-of-the-road systems. There are also currently some draw-in, clipping, and collision issues, although these can likely be ironed out over time. Character creation is also sort of a mixed bag. We like the fact that you can adjust specific facial features, control your toon's build, and pick from several canned voices, but limiting characters to one of just three human races seems to guarantee less variety in the long run; long-term itemization will be the key here.

Of course, if the game continues to sell as well as it has so far, Funcom will have plenty of time and funds to grind off the rough edges, creating an excellent MMO in the process. ▲

## Better On PC—*by Dr. Malaprop*

$49.99 (PC) • ESRB: (M)ature • Electronic Arts • masseffect.bioware.com

We really enjoyed playing through Mass Effect when it was released on Xbox 360 this past November. Developer BioWare originally published this game through Microsoft for the Xbox 360 and is now publishing it through Electronic Arts for the PC. Controlling Commander Shepard of the human Alliance military and his team through oodles of RPG combat to track down a rogue spectre was a blast. It's a great compliment to the game's overall design if that nearly identical game is entertaining to play again on the PC. What comes across with this Xbox 360-to-PC conversion is the identical plot and storyline, but with numerous tweaks that as a whole improve the entire gameplay experience. For more details on the game, please see our original Xbox 360 Mass Effect review in the February 2008 issue of *CPU*.

Mass Effect feels like it was created from the ground up as a PC game. In large part, this feeling stems from how seamlessly the game plays with the PC's keyboard and mouse controls even though it was originally designed for an Xbox 360 controller. The combination of keyboard-mouse and hotkey combos makes playing through the game less dogged without losing the option to pause anytime you want. Toss in higher resolution visuals, faster load times, improved planet lander controls, more save slots, and a free downloadable expansion (Bring Down the Sky), and you end up getting more and paying less.

You now have no excuse not to play Mass Effect. Kudos go to the developer for not simply porting the game to the PC but actually taking time to improve on the original. The best way to experience Mass Effect is on a PC, so revel in it. We are. ▲

## Guts To Slice & Dice—*by Dr. Malaprop*

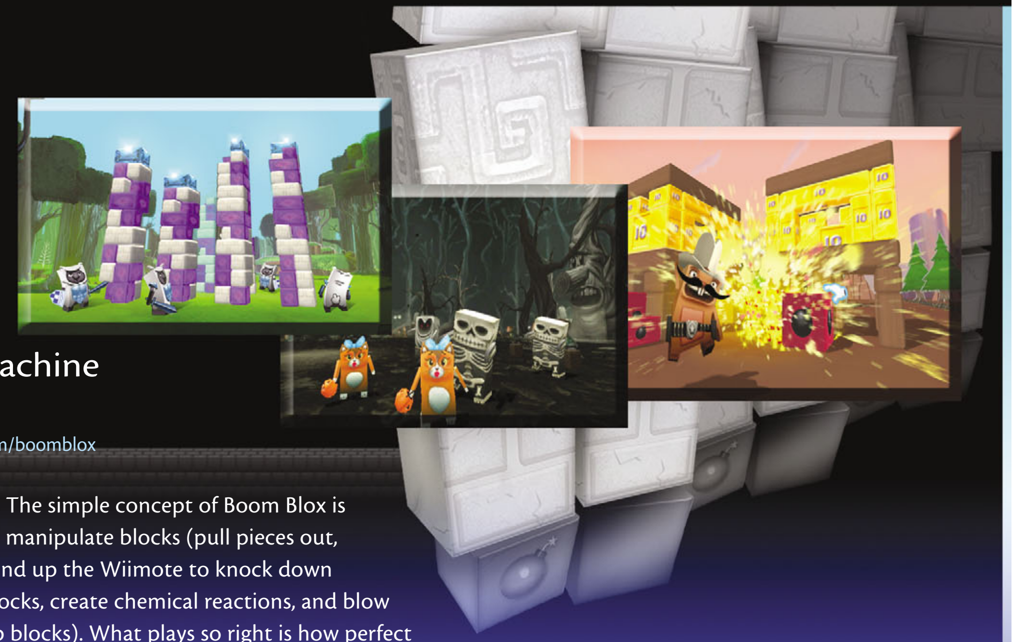
$59.99 (360) • ESRB: (M)ature • Microsoft • www.xbox.com/en-US/games/ninjagaiden2

The anticipation for Ninja Gaiden II has been running high. This is a series that defines bloody, pure, unadulterated action. The seemingly simple controls bring around a deeply satisfying combat experience as you work through the game's extreme carnage, consisting of buckets of blood and liberal limb separations. The scenery is attractive in parts but drab in others. However, it's not something you'll be able to give much attention to as you step through your bloody ballet. Much like Guitar Hero, pulling off the keystrokes for combos seems more effective when you're caught in the moment of gameplay rather than intentionally trying to implement one of a dizzying array of combos.

Learning to defend Ryu is a key part to the success of the Ninja Gaiden games. You'll have an ample number of new weapons to dismember enemies. Overall, the frame rate is smooth with an occasional stutter when body parts really start flying. The difficulty level of Ninja Gaiden II makes us wish for a co-op mode, but the game will survive several playthroughs thanks to an extensive combo combat system.

Like its predecessors, this iteration of Ninja Gaiden provides a strong sense of satisfaction as you progress through the myriad blood-drenched levels. If pure slice-and-dice combat is your thing, you'd do well to draw your sword as ninja Ryu Hyabusa. Gameplay never reaches the gratifying heights of 2005's Ninja Gaiden Black, but there's plenty here for fans of the series. Word to the wise: Novice and more gentle gamers may wish to first rent this game because the unrelenting and unforgiving difficulty is not for the masses. ▲

# BOOM BLOX™



## Stephen Spielberg's Incredible Machine

*—by Dr. Malaprop*

$49.99 (Wii) • ESRB: (E)veryone • Electronic Arts • www.ea.com/boomblox

Hearing about Boom Blox's play style did nothing to build hype. Knocking over stacked blocks? Yawn. However, playing Boom Blox changed our premature (and wrong) perceptions. Old-school gamers will see plenty of similarity between the interaction Boom Blox pieces and Sierra's early 1990s' The Incredible Machine. Take that classic game and toss in another classic, Jenga, then mix in solid physics and excellent tactile feel through the Wiimote. Now blend it all together and you'll have Boom Blox.

The simple concept of Boom Blox is to manipulate blocks (pull pieces out, wind up the Wiimote to knock down blocks, create chemical reactions, and blow up blocks). What plays so right is how perfect the Wiimote feels when manipulating the various odds and ends on-screen. This is the best non-Nintendo Wiimote functionality we've found on the Wii.

Also offered up are a bevy of multiplayer modes, but we're surprised to see how many modes need to be unlocked, which is our primary reservation about this title. Otherwise, there's much to have fun with here. We recommend icing your shoulders and taking ibuprofen after a long round of gameplay. ▲

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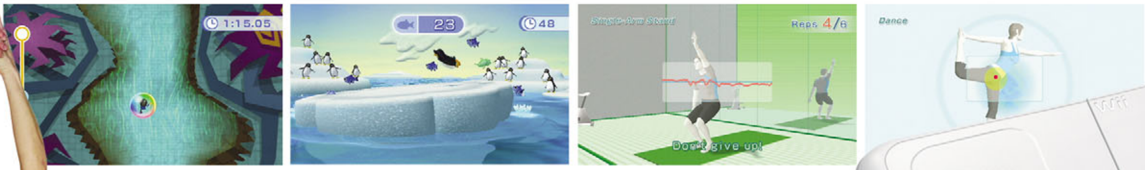
# Wii Fit™

## Brain Training For Your Body–*by Dr. Malaprop*

$89.99 (Wii) • ESRB: (E)veryone • Nintendo • www.nintendo.com/wiifit



Unboxing reveals a surprisingly sturdy feeling and aesthetically pleasing white balance board, four AA batteries, four additional leg extensions (for environments with deep carpeting), instructions, and the Wii Fit disc.

Upon starting, Wii Fit will take some of your measurements and provide you with a recommendation based around your BMI (body mass index), but it does not account for how it reaches its recommendations. For example, that BMI may mean something different for someone with high muscle content versus an overfattened gamer. The idea behind these recommendations is to make you fitter. Thus, the game will measure and track your BMI, help you set targets, and continue to encourage you on your fitness journey via a selectable male or female trainer. It's hard to take these metrics seriously, but for those who want to, more clarity on the recommendations would have been preferred, or perhaps a partnership with the Mayo Clinic and a URL for more granular details.

The software consists of four different exercise types: yoga, strength training, aerobics, and balance games. In yoga, you'll start out easy but can move up to some very complex moves. However, the moves start to get repetitive after a couple of weeks. Strength training will help you work up a sweat, and having the balance board during exercises, such as push-ups, is a fun novelty, but we're not sure how beneficial a Wii Fit is if you're not already motivated to do these regularly. Aerobics will get you moving, and we enjoyed Hula Hooping in our living room, but running in place with a Wiimote seemed gimmicky even if it did work up a lather. Last but not least are the balance games, many of which are entertaining and provide a feeling of accomplishment, particularly Tightrope Walk and the Marble Madness-esque Tilt Table.

A large portion of the exercises are unlocked based on how long you play other exercises in each section, which feels like poor design for a device you buy to improve your fitness. Each exercise is a single experience requiring a return to the menu for selection of new exercises. As a fitness device, Wii Fit begs the ability to create a workout program without having to fiddle with selection menus. Overall, Wii Fit is a fun diversion, but don't expect miracles unless you're already motivated to exercise. Wii Fit is not a replacement for nonvideogame exercise. ▲

## The Cutting Edge

by Barry Brenesal

# Online Service Providers

The other weekend, my wife and I were out shopping in a local mall. As we passed a local computer game store, I witnessed two people arguing loudly over which was the first-ever online service provider: Prodigy or AOL. It was the geek equivalent of two yokels from the Middle Ages debating whether a poultice of cow dung or a written prayer bound to a limb with string was the best way to treat gangrene.

The correct answer, of course, is "neither." Discounting the military-owned and -run ARPANET (1972), the Cutting Edge award for being the earliest major U.S. online service providers goes to CompuServe and The Source. Both appeared in 1979, while Prodigy and AOL made their debuts in 1988.

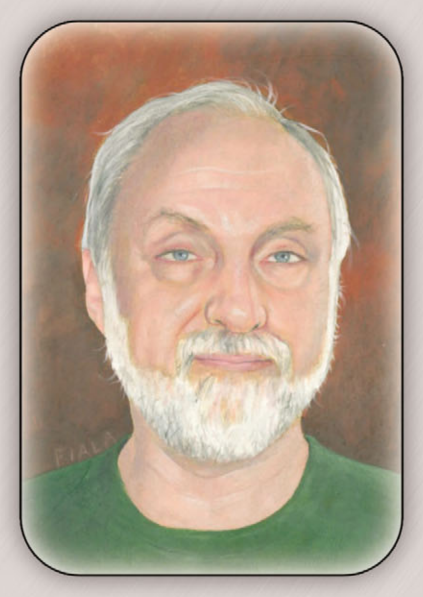
The Source was available via Tymnet and Telenet. It had a lot of online services to offer, including interactive games, stock quotes, computer news, travel reservations, shopping, and an online encyclopedia. With a $100 startup fee and usage fees of $10 per hour, however, it certainly wasn't cheap. It was also poorly marketed and never achieved a large audience, topping out at around 80,000 to 85,000 in the late '80s, compared to CompuServe's roughly 3 million in the mid-'90s. It was purchased by the latter in 1989.

CompuServe began life as a subsidiary of the Golden United Corporation in 1969, but at the time it was used only for in-house support and computer time-sharing. Online consumer services, such as messaging and forums, weren't added until 1979—and then only at night, when the servers weren't otherwise in use. This side of the business was offered through Radio Shack, and the retail chain's sales force was understandably unimpressed. They used "schlock timesharing" to refer to this new side of CompuServe, and the phrase even reached my ears some time later when I was pricing a new Radio Shack computer up in Minnesota. A salesman told me the service was only worth investigating if I wanted to watch a bunch of programmers "and other idiots" send screaming comments at one another online: a remarkably prescient comment about many Web forums, when you think about it. CompuServe hit its stride in the 1980s and remained on top through the mid-1990s, offering a range of services that included email, file sharing, and private transactions. But AOL had a serious impact on its business, and it eventually suffered the same fate as its one-time rival, The Source, as it was purchased by its main competitor.

The last of the early providers with a large, national clientele was GEnie. It came along in 1985, owned by General Electric Information Services (GEIS) and founded by Bill Louden, a former product manager for CompuServe. (Louden is credited with having created the first multiplayer online game, Megawars, in 1982.) The hallmark of GEnie was its excellent lineup of RoundTable discussion areas, each with its own forum, chatroom, and files library, often led by very knowledgeable people. Its multiplayer games were popular, too, especially at night, when costs went down and sheer numbers sometimes ground everything to a screeching halt.

Therein lay the problem that eventually brought GEnie low (and not the lack of servers, perpetuated by GEIS management's perception that the provider was little more than a cash cow for its business of time-sharing mainframes). Support was poor, and the company never put money into development to face the challenge raised by up-and-coming, user-friendly providers such as AOL and Prodigy. When new owners' raised fees simultaneously killed basic services in 1996—all with 12 hours' notice—members left in droves. Three years later, the remaining users quietly gathered in the RoundTables left to them on December 4th to bear witness as the plug was pulled.

It's hard to overestimate the influence of these pioneering national providers. With all they supplied—business, news, email, messaging, real-time chat, games, shops, forums—they were, for many people, the first sign of an emerging electronic community. Though now superseded by more specialized sites, they were the cutting edge in computerized communications for more than a decade, one step short of the modern Web. ▲



*Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100. It was last seen functioning as a boat anchor.*

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**Wax nostalgic with Barry at**
**barry@cpumag.com**

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# Software Tips & Projects

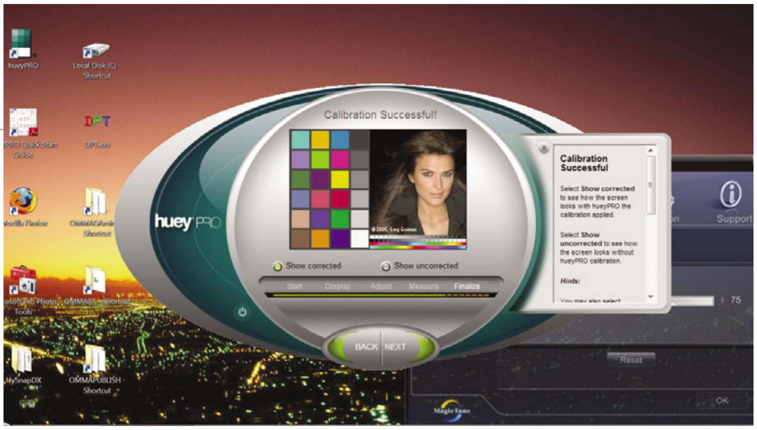
## Get The Color Right

We tweak, we mod, we optimize, but when it comes to our main point of contact with a PC, the display itself, we often leave the native settings untouched. This is a pity, because when you blast your way through a dark tunnel in Crysis or F.E.A.R. and can't make out that shadowy mutant who just eviscerated you, it may be time to rethink your calibration. Optimizing color intensity, balance, overall brightness, and contrast levels are *de rigueur* for digital photographers (or they should be), but display calibration helps everyone. Many LCDs come preset to what the pros call "torch mode," which looks impressive but actually can hide shadow detail with too much contrast. Many other monitors try to make flesh tones look rosier than they are by "pushing" the red levels, which makes everyone look sunburned. And so, for both gamers and digital imagining hobbyists, finding good tools for getting the colors straight is job one.

### Looking In The Shadows

Even if the nuances of proper color balance and intensity are lost on you, just about everyone, especially gamers, needs to calibrate their monitor's blacks, whites, and grays. One of the best, free ways to do this is to go to www.photofriday.com/calibrate.php and use Photo Friday's excellent Web-based guide. Make sure your monitor has been powered up and awake for at least a half hour before you calibrate it. Then, dim the lights in your work area so no light is directed at the screen but there still is enough ambient light to read. Press F11 to make the test pattern go full-screen (either in Internet Explorer or Firefox). Let your eyes adjust for 30 seconds. Now bring up your monitor's brightness controls. For the purposes of adjustment, start with the brightness set at 50% and contrast to 100%. Now, push the brightness up so you still can see a pure black in the leftmost square of the top row, but also so that you can make out a difference between the rightmost white squares. You want to achieve a pure white without overdriving the brightness, which will cause your pure black image to seem gray and will result in white text letter "bloom." Now go to the contrast control and pull that down just enough to make the gradations among the rings and squares pop up

For ultimate color calibration, use a hardware device such as the Pantone hueyPRO in combination with software controls to balance image output in ways the human eye cannot.



**Calibration Successful**

Select **Show corrected** to see how the screen looks with hueyPRO the calibration applied.

Select **Show uncorrected** to see how the screen looks without hueyPRO calibration.

***Hints:***

### Windows Tip Of The Month

Toolbars like the Quick Launch area of your Task Bar are handy in Windows because they launch programs with a single click. In Vista, you can create a new and larger toolbar for your Desktop, but it requires an odd process. Right-click the Desktop and create a new folder with any name you want your eventual toolbar to take. Now drag the folder off of the Desktop beyond the top or side border. Suddenly, a toolbar of that name appears. You can drag and drop program shortcuts directly into this area and they become one-click buttons that open a document or program. To close the toolbar window, simply right-click in the area to find the Close command. There are also other options in this context menu for changing the look of the Toolbar or to create a new one. You can even do this trick with an existing folder. Just drag it to the Desktop edge and it becomes a toolbar with all of its elements made into buttons.

### Registry Tweak Of The Month

Whether you're an office IT administrator or just a parent trying to keep the kids from changing the family PC's settings, you may want to restrict access to Windows Vista's Control Panel. In fact, with this Registry hack, you can lock down the CP altogether. Go to the Key Name HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer. Right-click to use New and DWORD (32-bit) Value. Name the new Value NoControlPanel and give it a value of 1. The effect is immediate. If you or anyone else tries to access the CP, an error message pops up notifying you that the command has been cancelled because of system restrictions.

without making the purest white seem too dim. Play with both controls until you are satisfied that you are getting the deepest black and purest white you can without sacrificing the visibility of the grays.

## Get Your Gamma

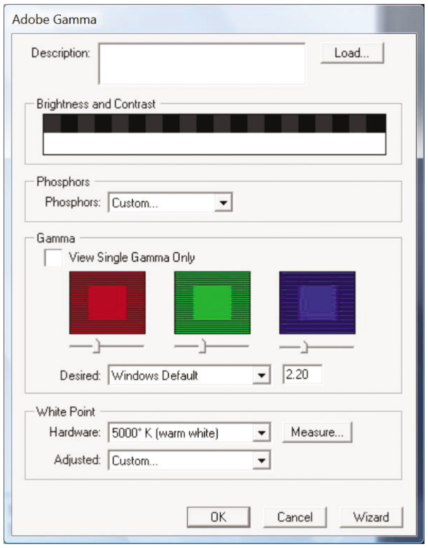
The gamma settings help determine how the mid-tones are displayed on a monitor. Gamma can have a distinct effect on color saturation and shadow detail. If you have Adobe PhotoShop, then you also have a tool called Adobe Gamma. In earlier versions of PS, Adobe Gamma was installed automatically in your Control Panel. In the CS3 version, however, many users report it missing. The program still is there, but you need to drill into the Program Files section of your boot drive. In the Common Files/Adobe/Calibration folder, you will find the Adobe Gamma.cpl file. Double-click this to open the program and choose the wizard. Eventually, you will get to three colored boxes.

Adjusting gamma using the standard tools can be trying. Either with individual color channels or a single gray patch, you are trying to adjust your settings so that a pure-colored square in the middle of a pattern will match in intensity the surrounding color pattern. The best advice for getting this right is to step back about 10 feet from the monitor (bring your wireless mouse with you to change the settings) so that the black lines in the outer square disappear. Now, try to match the inner and outer squares for each color. Before you finish Adobe Gamma, you will have the opportunity to compare the current settings with the earlier ones and discard or save them to an ICC profile, which you can recall at any time.

If you don't have one of the PhotoShop programs, a very good free program called QuickGamma is available at www.quickgamma.de/indexen.html.

## The Ultimate Solution

If you are into digital photography, then many of these manual eyeball calibrations may still lead to frustration when you print photos that don't even approach their appearance on your display. For the most consistent and reliable display settings, you need a hardware and software tool such as the hueyPRO (www.pantone.com). This pen-sized stick is among the least-expensive but reliable color correction devices available. Load the software and connect the device to your USB port. The software walks you through basic brightness and contrast settings. Then you attach the hueyPRO stick to your monitor. Its electric eye reads the colors from the screen as the software rotates through a series of hue states and adjusts the monitor. It will finalize the adjustments and load your settings.



Phosphors: Custom...

☐ View Single Gamma Only

Desired: Windows Default 2.20

Hardware: 5000° K (warm white)

Adjusted: Custom...

The dreaded calibration matrix. In manual calibrators like Adobe Gamma, the user must try to match the look of the inner squares with the pattern around it. Easier said than done.

On LCDs, where the backlighting often is competing with sunlight, the look of your display will change throughout the day. The beauty of the hardware/software combination is that the hueyPRO remains attached to your PC at all times. When the "Room Lighting Compensation" feature is toggled on, the device reads the amount of ambient light around your monitor and adjusts the display so that the monitor output remains relatively consistent despite changes in the lighting environment.

## Play With Color

Just as your display gives you granular control over each of its color channels, photo-editing software can do the same for digital images. For instance, take a photo that may seem lackluster and load it into PhotoShop. Use the Layer/Adjustment menus to open the Hue/Saturation control window. This tool can adjust any of the six color channels. In your photo, look for the object you want to stand out from the rest and use the drop-down menu to choose the color channel that best fits its dominant color. For a test photo we took of a cat, the yellow and red channels were dominant. We chose each channel and then brought the Saturation slider to the right until the cat's fur colors popped from the background without seeming dyed.

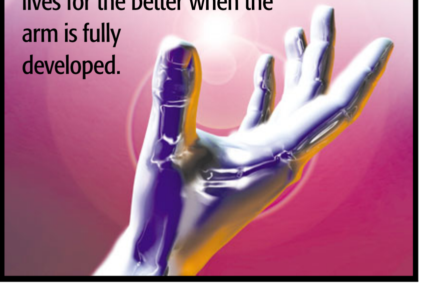
Because all visible color generally is a combination of hues, it's tough to determine how much cyan or magenta there may be in an image. You can see which areas of the image each channel affects by sliding the Saturation control to the far right. This will blow out that color and reveal to what extent it is part of the picture. In our cat photo, pushing the magenta channel all the way revealed it touched only the inner parts of the cat's ears and a pink toy in the background. By turning that channel down we desaturated these minor background colorse. We recommend restricting yourself to the Saturation slider and leaving the Lightness and Hue sliders alone. ▲

**by Steve Smith**

## Infinite Loop

### Building A Better Bionic Arm

Dean Kamen, inventor of the Segway, has recently been showing off his latest major project, a prosthetic arm that can be attached directly to the user's nerve endings and is deft enough to grab a single piece of paper. That's an impressive feat of engineering that should change a lot of lives for the better when the arm is fully developed.



blog.wired.com/gadgets/2008/05/dean-kamens-rob.html

# Warm Up To Penguins

## The Audacity Of It All

Since Linux started to make inroads into the desktop market, there has been a group of applications on everyone's wish lists, applications that filled significant holes in the Linux desktop experience. One of those has been a powerful audio-editing package, something that could hold its head up to Sound Forge the way that The Gimp does to Photoshop. The history of audio on Linux has been a series of complicated command-line utilities that let you do a lot . . . if you could figure out how to use them. But Audacity is changing all that by offering a multitrack audio suite that has features galore.

Because we're all about the Penguin in this little corner of *CPU*, we'll look at the experience under Linux. Almost any current distribution will let you install Audacity through the native package manager. (For example, "apt-get install audacity" does the trick in Ubuntu.) Under GNOME, you should see it on your Start menu under the Sound And Video section. When it first starts, you'll see a big blank gray section with controls above it. That blank area is where the audio tracks will load for editing.

### Cue It Up

Before we start editing, we need to set up a few basic settings. If you're only going to be editing material you've already recorded (MP3s or OGG files, for example), you only need to configure your output sound device. Click Edit, then Preferences, and find the settings you need under Audio I/O. You'll want to set Playback Device to whatever you're planning to use to listen, which will depend on your computer and what you have for audio gear. And if you're going to be recording with a mic or from a line-in source, such as an MP3 player, you'll want to configure the recording device, as well.

Once you've configured all your audio devices, you're ready to start playing with Audacity. Let's start by loading in a song in MP3. We used a copy of a Jelly Roll Morton blues song, which is in the public domain and in MP3 format, and loaded it into Audacity to spice it up with a techno remix. (Don't ask. Sometimes things get a little crazy here at *CPU*.) We clicked File and Open and selected the MP3 file.

Of course, if you're following our steps and have installed Audacity via an installer such as yum or apt-get, you'll get the same nasty surprise we did. For legal reasons concerning MP3 patents, Audacity doesn't have built-in MP3 support. Your best bet is to grab an MP3-to-OGG converter, such as soundcoverter, and turn your source material into OGG format, which Audacity can load with ease.

The good news is that you can actually configure Audacity to save as MP3. If you grab the LAME library and tell Audacity where it is, Audacity will be able to save files as MP3. We'll show you how to do that in a bit, but first, let's turn our source file into OGG using the converter of our choosing. We can convert our file using the following command (as a single line of text):

```
mpg321 jellyrollmorton-
SmokeHouseBlues.mp3 -w raw &&
oggenc raw -o jellyrollmorton-
SmokeHouseBlues.ogg
```

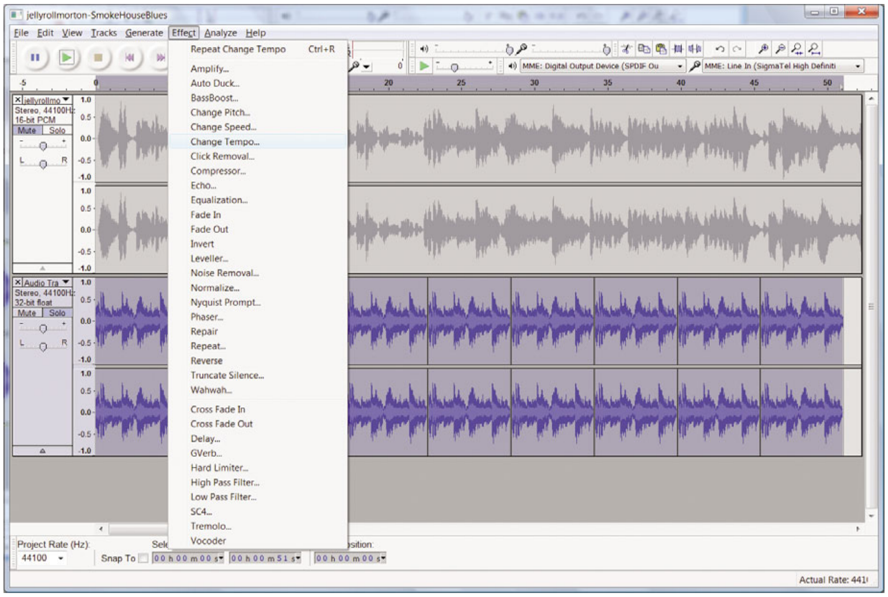
This command converts the MP3 to a raw audio format, and then from a raw audio format to an OGG file. Now we can open the OGG file in Audacity. If you've ever used a sound-editing tool, this will look very familiar, with a waveform running across the screen representing the audio you've loaded.

### Lay Down The Beat

Our first step toward techno bliss was to grab a sample of the song, which we would speed up and loop. Doing this was as easy as using the Magnify tool (which looks like a magnifying glass) to zoom in until we saw the clean beginning and end of a section. Using the cursor, we drag-selected the section and pressed CTRL-C to copy it.

Next, we created a new track to hold the beat track we wanted to build. We clicked Tracks and Add. In this example, we wanted to add a stereo track. The second track will appear empty directly below the track we imported. We clicked on the blank area under the left/right panner on the track, which selected the track. Then, we pressed CTRL-V to paste the sample we copied.

The Effects menu has all sorts of useful tools, including a Tempo tool. The Tempo tool will change the speed of



The Effect tools can change the speed, pitch, or tempo of the audio, and that's just the start.

the sample without changing the pitch. We tripled the speed of our sample and then used Copy and Paste to make a bunch of copies on this track, providing a steady beat.

We added another track, grabbed another sample, but instead of speeding it up, we slowed it down using the Speed tool, which also changes the pitch (like playing a record at half-speed). Slowed to 1/10th speed, our sample sounded like a blue whale with indigestion. (But hey, kids will listen to anything these days, right?) We used the Normalize tool to bring the level of the audio to the maximum level without causing distortion.

When we played our creation, we heard all three tracks at once. Sometimes you'll want this, but sometimes you'll want to drop a track from the mix (or just listen to a single track). For example, we really don't want to hear our source track every time we play back the track we're building. To drop that track out of the mix, click the Mute button at the far left of the track. To only listen to a single track, click the Solo button. You can mute as few or as many tracks as you want; naturally, you can only solo a single track.

We wanted to add a vocal track, too, so it's time to do some recording. On the far right, you'll see a speaker and microphone icon, each with an accompanying drop-down menu. Use these to select the input and playback sources. Hopefully, you already have a playback source that you can hear, or the previous exercise would have been pretty quiet. Next, we picked an input source hooked up to a microphone (in this case, using line-in through a mixer).

If you press the red Record button, Audacity automatically creates a new track, starting on the timeline where the cursor currently is. Let's say that you want to hear the music as you record. To make sure this can happen, click Edit and Preferences. Then, select Audio I/O and make sure Play Other Tracks While Recording New One is checked. One thing that may surprise you is that Audacity creates a new track every time you press the Record button. It doesn't append it to the previous track. You can cut and paste from one track to another to consolidate.

Finally, we were ready to save our file as an MP3. If you remember, we needed to download the LAME library to do this. We clicked Edit and Preferences and selected Audio Files, and Audacity presented us with a nice button that took us to the page to download the library; another button prompted Audacity to locate it once downloaded. With the library in place, we muted any tracks we didn't want on the finished mix.

To save the file as an MP3, we clicked File and Export (not File and Save/Save As). We chose MP3 as the format and were all set. You can use the Options button to change bit rate, and the encoder will automatically ask you for MP3 metadata.

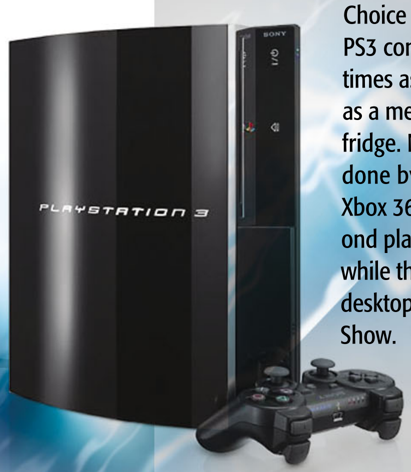
So there you have it, a brief introduction to Audacity. As usual, we've barely scratched the surface of this app. But we're confident that you aspiring open-source audio engineers will be on your way to creating mixed masterpieces in no time. ▲

**by James Turner**

## Infinite Loop

### The Big Power Hog? Your PS3

If you want to shave a few dollars off your energy bill, don't downsize your refrigerator. Instead, look to your videogame console. A study conducted by Australian consumer organization Choice found that the PS3 consumed five times as much power as a medium-sized fridge. Not to be outdone by its rival, the Xbox 360 won second place "honors," while the "average desktop PC" took Show.



Source: www.choice.com.au/viewArticle.aspx?id=106346&catId=100245&tid=100008&p=4&title=Computers'+energy+costs

by Mike Magee

# Nano Chips Away At Intel's Atom

A confirmation of my doubts about dual- and multicore processors came from an unexpected (or, in retrospect, maybe not-so-unexpected) source.

Glenn Henry is the founder of Centaur Technology, a startup which was originally owned by IDT (Integrated Device Technology), that was purchased by Via in 1999.

I interviewed Henry a day before Via announced the introduction its Nano line: five low-power microprocessors intended for use in devices from MIDs to notebooks that don't need all the megahertz of cutting-edge chips.

Via, of course, has occupied a cozy little niche for the last year or two—the days of the great chipset wars and the battle between two opposing memories, DDR and Rambus, are long over. Much of Via's business has been in the embedded market, and it's only in the last six months or so that the company has made design wins with the previous architecture to the Nano, the C-7.

Talking with Henry, it very quickly becomes clear that he's an architect who is more interested in technology than in marketing, and that he understands some pretty basic concepts about the function of a CPU. Of course, he has an axe to grind. If Via hadn't provided its funding, no doubt Centaur would have had a hard time surviving in the cut-throat world of x86 chip manufacturing, with most of the loud banging and alarums made by the Tweedledum and Tweedledee of microprocessors, Intel and AMD.

Henry describes the Nano, formerly code-named Isaiah, as being completely designed from a blank piece of paper, and says the only thing it inherits from the C-7 is its pin compatibility. This, he says, is actually one of its greatest strengths. Because a lot of real-world designs, in the embedded market and otherwise, have been built using the C-7, the platform itself is well-tested, and system designers just need to plug in the appropriate Nano for the job.

*Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.*

I was mildly surprised to find that he was quite fulsome in his praise of Intel and its 45nm process technology. The C-7 was built on a now rather-ancient 90nm tech, while the Nanos use a 65nm geometry and are built at the Fujitsu foundry. He clearly wishes that the Nanos were built on the same geometry as Intel's Atom chip, but I asked him several times during my interview about performance, and he seemed honestly convinced his designs were more than sufficient to meet the challenge.

When I asked Henry for his thoughts about dual-core processors, he told me I'd managed to get him on his soapbox. He maintains that AMD and Intel need some new way to present their technology now that megahertz is no longer the battleground, and this is why they have taken the multicore route. He said what I guess we already know—that there are precious few software applications that take advantage of more than one CPU core, and that it's only the real data crunching or media apps that need that level of processing power. Most people, he pointed out, surf the Web, read email, and use word processors and other familiar applications, none of which require more than one core.

Does this mean there won't be a dual-core Via Nano? Henry didn't say definitively, but if we interpreted his remarks accurately, we shouldn't entirely rule out this eventuality. As we know, marketing requirements often pull chip companies away from pure technology and into realms that engineers don't feel comfortable with, such as logos, cutesy brand names, and benchmarking. But it is rather refreshing to have a contender in the realm of small devices in the shape of Via with its new introductions. It will keep the other, bigger players on their toes, and ultimately that can only benefit those of us who buy and use their products. ▲

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**Send rumours to "Mad Mike" Magee at**
**mike@cpumag.com**

# Wagging The Dog

by Rahul Sood

# Apple Fanboys

It was a joke, on my birthday. It's okay to laugh. . . .

Until recently, I hadn't felt the wrath of Apple fans since the time we successfully installed Windows on an old pre-Boot Camp iMac. I remember we made Windows work in order to do some performance comparisons and posted it on my blog. I received a ton of comments along with mail from Mac fans, most of whom accused us of making it up, some asking how we did it, and then a month or so later, Apple released Boot Camp.

Before I go much further, I should try and give you some context as to what it's like being a "youngish" CTO at HP with 20- to 30-something-year-old friends. In 2001, after Apple launched its iPod, I was watching closely to see how the media and the public reacted to a technology that wasn't entirely new, but that was packaged and marketed in a somewhat revolutionary way.

Rahul Sood's love for computers started at the young age of 11. Much to the shock and dismay of his parents, he ripped apart his brand-new Apple //c and painted it red before turning it on. His parents' dreams of having a doctor for a son were shattered when college drop-out Rahul founded what is now one of the most respected high-end computer companies in the world, Voodoo Computers.

Shortly after the launch, we witnessed cool companies jumping at the chance to create accessories for the iPod. Burton Snowboards, for example, created an iPod-compatible vest, complete with controls built in below the front pocket. Back then, I knew that Apple was on to something, but getting people to listen was a bit of a struggle. While Apple continued to focus on cool design and customer experience, the iPod started to make inroads as a brand with young people while the rest of the industry was focused on selling volume devices.

In the years that followed, Apple continued to create meaningful experiences and beautiful software, mostly appealing to young people as they continued to build their business on the back of music. It was during this period that the people I hung around with started to buy Apple products for their cool factor, and even though many of my friends own Voodoo products, Apple was their choice for mainstream computing.

Several years later, I find myself working at HP, and as I've said before, I love this company. HP understands what the market lacks and is good at meeting those needs, but this becomes increasingly difficult as HP caters to markets on a grand, global scale. We sell millions of systems a month to people from all walks of life. We are managing three brands (Compaq, HP, and Voodoo), a massive number of SKUs, and we are growing at an incredible rate. It's hard to imagine a company the size of HP growing further, but the fact is we are, and we realize the challenges that are ahead of us.

We are creating beautiful devices that are cool, simple to use, and meaningful. We relaunched Voodoo on June 10th, a process that began with our old Web site beginning to burn down on June 6th. We are even working on our own internal software to make the overall experience better.

Anyway, back to my friends. I have friends from many backgrounds, but the common thread we all share is our love of technology. I take constant ribbing over the Mac vs. PC debate, but I like to think that I have a good sense of humor. We all enjoy the Apple ads with the young, hip Mac guy and the stiff, middle-aged PC guy.

So for my birthday, I went to my friend Jeff's house for a party with some friends. They surprised me with a cake, and when Jamie from PhoneTag jokingly handed me a MacBook Air as a gift, I immediately cut the cake with it. Everyone was in hysterics, and really, it was just a joke. I can build notebooks in my sleep; I assure you no Macs were harmed in the taking of the photo.

Well, Jamie posted it on his blog, and I wrote an explanation on mine, and all of the sudden it was everywhere. Mac fans were going crazy; I received more than 150 messages from various mediums in a period of two hours. Many recognized the joke, while others were simply unreasonable.

Why is it that some people can poke fun at PC and Windows users all the time, yet when someone makes a simple joke by cutting a cake with a fairly sharp product, he gets blasted by a bunch of angry fans? Whatever the answer is, I applaud Apple for successfully maintaining a fan base—it's no easy task—and I humbly suggest to Apple fans that it's OK to laugh at yourself once in a while. ▲

**Send your opinions to this opinionated guy at rahul@cpumag.com**

CPU

# Look For *CPU* At These LAN Parties Across The Nation!

**07.05.08**
LANmaniac BYLOC LAN Party, Bellflower, CA
www.lanmaniac.com

**07.05.08**
SOLAN XXI, Enon, OH
solan.x10hosting.com

**07.11.08**
Chris' LAN Fest, GA
cealerslanfest.com/default.aspx

LPB Asylum 12, Gatineau, Quebec, Canada
www.lpbasylum.com

**07.12.08**
North Bay LAN's, ON, Canada
pc-solutionz.ca/lanparty/index.html

NWALAN, Fayetteville, AR
www.nwalan.com

**07.18.08**
Americas Army 2008 Chicago LAN,
Chicago, IL
aalan.cyberbawx.com

Lantacular, Cincinnati, OH
www.lantacular.com

LANsomnia 2008, Miramichi,
New Brunswick, Canada
www.lansomnia.ca

PDXLAN 12, Portland, OR
www.pdxlan.net

ROGCon, Dallas, TX
www.rogcon.com

**07.19.08**
BRAGcon, Baton Rouge, LA
www.BRAGcon.net

LAN Stanley, San Antonio, TX
www.myspace.com.lanstanley

Whempy's LAN Party, Columbus, OH
whempyslan.org

**07.25.08**
GVCCLAN, Placerville, CA
www.gvcclan.com

Massive LAN, Little Valley, NY
www.massivelan.com

**07.26.08**
ATD Arena, Charlotte, NC
www.atd-arena.com

LANmaniac BYLOC LAN Party, Bellflower, CA
www.lanmaniac.com

**07.31.08-08.03.08**
QuakeCON 2008, Dallas, TX
www.quakecon.com

**08.01.08**
AelatisLAN, Surrey, British Columbia
www.aelatis.com

Digital Storm LAN, Aldergrove, British Columbia
www.digitalstormlan.com

**08.04.08**
VanLAN, Vancouver, Canada
www.VanLan.ca

**08.07.08**
Dark LAN, Euclid, OH
darklan.thedarkserver.com

**08.07.08**
Fragapalooza, Edmonton, Alberta, Canada
2007.fragapalooza.com

Fragapalooza, Alberta, Canada
www.fragapalooza.com

**08.08.08**
LAN OC, Ohio City, OH
lanoc.org

**08.15.08**
AWOL LAN, Wisconsin
http://www.awollan.com

**08.16.08**
LANmaniac BYLOC LAN Party, Bellflower, CA
www.lanmaniac.com

North Bay LAN's, ON, Canada
pc-solutionz.ca/lanparty/index.html

NWALAN Old School, Fayetteville, AR
www.nwalan.com

**08.22.08**
AELAN, North Vancouver, British Columbia
coming soon

GVCCLAN, Placerville, CA
www.gvcclan.com

**08.26.08**
Midwest LAN, Wisconsin
www.midwestlan.com

**08.30.08**
ATD Arena, Charlotte, NC
www.atd-arena.com

**09.06.08**
LANmaniac BYLOC LAN Party, Bellflower, CA
www.lanmaniac.com

**09.13.08**
DragonFire LAN, Erie, PA
www.dragonfirelan.com

**09.13.08**
The[CARE]Clan and 313 Gaming, Ferndale, MI
www.fop130.org/index.html

**09.20.08**
North Bay LAN's, ON, Canada
pc-solutionz.ca/lanparty/index.html

**09.21.08**
St. Louis Center LAN, Missouri

**09.26.08**
GVCCLAN-, Placerville, CA
www.gvcclan.com

**09.26.08**
LanAddict Fall Frag Fest, Orangevale, CA
www.lanaddict.com

**09.26.08**
Overkill LAN Party, Tampa, FL
www.overkill-lan.com

**09.26.08**
Winlock LAN, Winlock, WA
www.lan.team-tb.com

**09.27.08**
ATD Arena, Charlotte, NC
www.atd-arena.com

**09.27.08**
FSLAN, Fort Smith, AR
www.fslan.com

**09.27.08**
WCU LAN 2008, Cullowhee, NC
wcugaming.org/?page_id=6

**10.10.08**
Necronomicon, Florida
www.seads.org/LANParty/necrolan.htm

**10.24.08**
GVCCLAN, Placerville, CA
www.gvcclan.com

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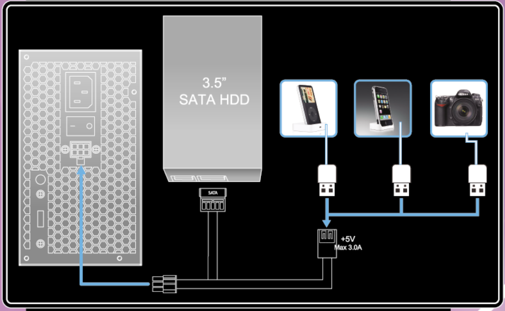

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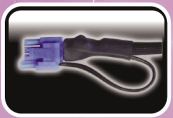

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# Technically Speaking

## An Interview With Joshua Levy, Managing Editor Of Change.org

Joshua Levy is the Managing Editor of Change.org and former Associate Editor of the Personal Democracy Forum, the parent site of TechPresident.

**by Barry Brenesal**

**CPU:** Just to make clear a distinction, here: We interviewed Professor Jay Rosen of NY University a while ago about his plans for Off the Bus. This was a way of getting more varied and in-depth, accurate coverage of all the candidates on the election trail by largely resorting to volunteers, who would be trained in good journalism techniques. TechPresident instead tracks the way the campaigns and individual people use the Web to affect the election, correct?

**Levy:** Exactly. Off the Bus is an experiment in investigative journalism. It uses crowd sourcing, collaboratively authoring articles through volunteers on-the-ground while following the presidential election. TechPresident is not a citizen journalism operation. We're a professional operation. I get paid to do what I do. We do a lot of "inside baseball" reporting on what happens inside the tech world as it relates to presidential politics, and what's happening in presidential politics as it relates to the tech world. The people that are writing for our site are veterans of past presidential campaigns. They discuss strategy, grassroots activism, and the way the Web is changing the process by which we get involved in politics.

**CPU:** Speaking of your staff, that's a pretty impressive one you've gathered. I noticed you had the Webmaster of Bush/Cheney '04, also the former campaign director for the Republican National Committee, as well as the former Director of Internet Marketing for the Democratic National Committee and Kerry/Edwards '04. Did you seek out this kind of political balance between the two major parties?

**Levy:** From the moment we started developing the idea for this site, we conceived it as a cross-partisan project. The Personal Democracy Forum, of which TechPresident is an offshoot, is itself cross-partisan: a yearly conference that attracts politicians from across the spectrum, as well as technologists.

**CPU:** Why would the casual Web visitor who drops by your Web site find it of particular interest, enough to add it perhaps to his Favorites list?

**Levy:** In 2008, I would say that most of us have at least heard of Facebook, or MySpace, or YouTube. Better yet, some of us have used those tools regularly to discuss or follow the election. I think this demonstrates a lot of people are interested in both the race and the technology. The way that we execute our project gives it a narrow focus that really hones in on exactly how specific technologies such as email, online video, and Twitter are being used—and by whom, and for what intended audience.

**CPU:** In May of 2007, TechPresident issued a challenge: Who will be American's first Tech President? You then set out six specific policy goals to test the candidates' awareness of advocacy of the Web. I'd like to review each of these and get a comment from you on it.

"1. Declare the Internet a public good in the same way we think of water, electricity, highways, or public education."

**Levy:** It's a response to what is known as the Net Neutrality movement. We're trying to ensure that the Web cannot be deregulated, so that companies such as Comcast or Verizon are allowed to charge additional fees on top of their regular ones for Internet access.

**CPU:** "2. Commit to providing affordable high-speed wireless Internet access nationwide."

**Levy:** This is related to our first goal. If we think of the Internet as a utility that serves the public good, like water or electricity, then high-speed access should be guaranteed to every American. We've seen other countries take on very ambitious Internet projects, such as South Korea's attempts to provide Web access for every citizen. They've been largely successful, and the results of that are very clear: The quality of life and the level of education have increased. People have more access to information, and they're able to take more control over the public aspect of their lives. We think doing the same sort of thing here is a very necessary step to take.

**CPU:** "3. Declare a Net Neutrality standard forbidding Internet service providers from discriminating among content based on origin, application, or type."

**Levy:** This is the explicit Net Neutrality argument, that we should forbid ISPs from charging on a content basis.

**CPU:** "4. Instead of 'No Child Left Behind,' our goal should be 'Every Child Connected.'"

**Levy:** We think that schools across the country should be wired, full-tilt. Every child at school should be guaranteed broadband access and high-speed Internet, because this is the backbone of learning in 2008.

> I think we can say now that where presidential politics are concerned, the Web has reached its adolescence —*Joshua Levy*

**CPU:** Just to be clear, what you're saying is that whoever is elected president should pursue a variety of actions that eventually lead to this goal. Correct?

**Levy:** Absolutely. We're not saying that the government should necessarily fund this, but that the president should recognize this as a prioritized part of an education platform.

**CPU:** "5. Commit to building a Connected Democracy where it becomes commonplace for local, as well as national government proceedings, to be heard by anyone any time and over time."

**Levy:** We've seen a few experiments on this level. There was a project in Utah started by a state legislator, called Politicopia [www.politicopia.com]. It was a site set up for any citizen to access, where they could suggest, comment, and collaborate on the writing of legislation. We think that these kinds of projects are really positive developments, because they're leveraging a technology which is inherently democratic if everybody has access.

**CPU:** This has the possibility of being very controversial. While there are some politicians who would obviously favor this kind of citizen involvement, there are others who feel that they themselves were elected, rather than their constituencies.

**Levy:** Sure, and there are some citizens who would say, "We've elected you to do this work, and every four years I'll go back into the voting booth. That's my job." Others, though, want a more active part in government. Let's be clear: There are a variety of ways to enact this Wikifield kind of democracy. With so many different ideas present, I don't think we've gotten far enough along to say which one is better than the others.

**CPU:** "6. Create a National Tech Corps, because as our country becomes more reliant on 21st-century communications to maintain and build our economy, we need to protect our communications infrastructure."

**Levy:** This is largely a reaction to the aftermath of 9/11, when a lot of the technological infrastructure went down in New York City. We need to make sure that the technological backbone stays intact, in case another such catastrophe ever occurs. We depend upon the Web and take it for granted. But if we lose it, we don't currently have any plan in place for quickly getting back in business. This could lead to even greater tragedy than occurred in 2001, given the rate of change since then.

**CPU:** What sort of other resources does TechPresident provide besides daily reporting on the candidates?

**Levy:** We're very well-known for our charts. We have sets of data that show how many Facebook supporters, MySpace groups, YouTube views, blog mentions, and Eventful "demands" each candidate is getting. Each of our charts details this content and displays it on a timeline. That data has been extremely popular. A lot of journalists reference it all the time.

**CPU:** And the Internet is being used to gather information on the presidential candidates by everybody, far more than it was in previous campaigns.

**Levy:** In 1996, the World Wide Web was barely in existence. In 2000, it was being used to raise money—by John McCain, ironically, who is not using the Web all that effectively this time. I think we can say now that where presidential politics are concerned, the Web has reached its adolescence. A lot of that, I would argue, is thanks to the influence of Howard Dean supporters who found their voices in 2003 and 2004, learning how to blog for presidential politics and how to use the innate social characteristics of the Web in order to organize and take local control of their candidate's message. It created a strong grassroots movement among Democratic activists that is now playing itself out for the first time on a truly large scale in Barack Obama's campaign.

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by Kristina Spencer

# Under Development

A Peek At What's Brewing In The Laboratory

## A Little Buzz Goes A Long Way

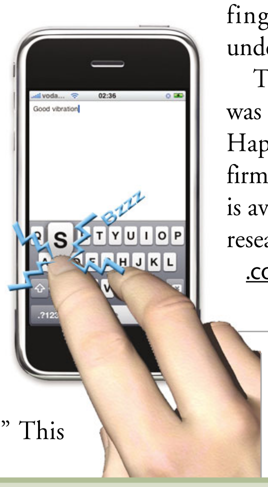
You love your pretty (and useful!) iPhone. You hate to complain, but there's just one thing: Wouldn't it be nice if the keyboard actually felt like a keyboard? All those typos and accidental keystrokes would disappear with a little additional sensory input. Although Apple may appreciate your slight annoyance, two PhD students at the University of Glasgow felt your pain and did something about it.

Enter HapticKB, a haptic project created by Malcolm Hall and Eve Hoggan of the Computing Science Department at U of G, for the iPhone. The duo considered the fact that mobile interfaces have been based on static desktop design—not exactly the perfect marriage of usage and user interface. Hall and Hoggan noted two reasons for improving the iPhone's UI design with tactile feedback. First, because the UI requires visual feedback, users typing on the touchscreen may not notice errors because their fingertips cover the button images, making it difficult to see if the wrong button is pushed. Also, because the screen requires a user's visual attention for input, the iPhone is less than ideal when the user's visual attention is needed elsewhere. (Think driving or watching a presenter.)

The team's prototype utilizes the iPhone's existing vibrotactile actuators to create a quick vibration that mimics the feeling of pushing a physical button. Fingering over a key triggers a one-beat "click" similar to pushing down, and fingering off triggers a shorter, lower-intensity, one-beat "click." This ratio of tactile feedback creates the sensation that a button has been depressed and subsequently snapped back to its original position.

Using the same vibrational cues, the team also created a feature that allows a user to feel the edges of keys, reducing finger slippage and the number of undetected errors.

Though the prototype's first release was a bit buggy, Hall and Hoggan say HapticKB is now stable with iPhone firmware update 1.1.4. The prototype is available as a free download from the researchers' Google page (code.google.com/p/iphone-haptics). ▲



The HapticKB project uses tactile feedback to reduce typing errors on the iPhone's touchscreen.

## Lasers Replace Wires In Chips Of Tomorrow

It's the technological form of Sisyphusian hell: You upgrade to the latest and greatest PC, adding speed and power and thinking that this machine might be the one you can live with for more than 18 months. But, as always, once the initial love has worn off (and newer models are released), you realize it's still too slow. Again.

What if, in your next upgrade, your machine would not only be more compact and more energy efficient but also 1,000 times faster? That's what Sun Microsystems is hoping to offer you, if its high-risk research (the expected chance of failure is 50%) replacing the wires in computer chips with lasers pays off. Part of a new field called silicon photonics, Sun's chips use lasers to transmit binary data by alternating between light and dark (using photons); traditional chips send data using electrons through high and low electrical currents.

The benefit of using lasers over wires is far-reaching, says Xuezhe Zheng, one of the researchers on the project. Photons don't interact, so many different data streams can be carried along on the same medium concurrently. Electrons do interact, so typically wire can only carry a few data streams at best. Additionally, electrons consume more energy during transmission than photons, as the wire that moves the electrons has to charge in order to do so. Essentially, photons can carry more info at a faster rate with little interference and energy loss.

Yet Sun's team is continually challenged by the status quo. "Despite these large native advantages of using lasers over wires, wires are still the dominant technology on silicon processors today," says Zheng. "The reason is that all computation on chips is done electrically, not optically. Therefore, using optics to communicate means that we have to first convert electrical signals to optical signals, and later back to electrical form. This conversion today is far more expensive, in both area and power, than what you save from optical transmission."

The next steps are reducing both area and energy costs per optical bit in the conversion development. Though an "aggressive goal" by Xuezhe's admission, the researchers hope to reduce the cost of conversion one-hundredfold during the course of their program.

Although the team will continuously roll out new prototypes to their technical community as their program develops, they hope to be able to demonstrate a marketable prototype within a couple of years. ▲

## Students Get A New View On Scientific Concepts

Lionel Zupan, associate director for research technology, demonstrates Tufts' VisWall.

Photo credit: Joanie Tobin/Tufts University

What is it that dynamical systems theory, fluid dynamics, and high-energy physics all have in common? All are complex, often mind-bending concepts for students trying to absorb them. Luckily for Tufts University students studying these subjects, professors are utilizing Tufts' new "VisWall" to teach some of the concepts.

The VisWall is a 14- x 8- x 12-foot (HxWxD), seamless, single-screen wall that features an ultra-high-resolution display system, using two overlapping rear projectors to create enhanced detail and clarity in its 4,096 x 2,169 display. Projectors also use special Infitec filters, which virtually eliminate any ghosting in 3D images.

"Stereoscopic vision is achieved by overlapping left-eye and right-eye images on the same display (one projector for each image), and special glasses worn by users 'merge' both images to provide the 3D rendering," explains Lionel Zupan, Associate Director for Research Technology.

Not satisfied with just projecting images and animation, VisWall's creators also imbued it with a haptic system, wherein users can feel what they are viewing through various feedback forces.

What does this mean to Tufts' faculty and students? Simply by entering relevant data into VisWall's software, students in laparoscopic surgery training will be immersed in a realistic visual display and able to "feel" a virtual tumor, bone, or soft tissue while simulating a procedure. It helped mathematics professor Boris Hasselblatt found unexpected order in a well-known chaos theory formula: A subtle pattern became very clear once the data was enlarged on the VisWall. Bruce Boghosian, chairman of the mathematics department, can now better understand his study of fluid flow by following simulated streamlines and reservoirs on the VisWall.

Future projects for the VisWall include chemistry, computer science, public health, family medicine, drama, and dance. Although the VisWall was developed by (and is housed in) Tuft's Center for Scientific Visualization in the School of Engineering, it is available for use by the entire university.

## Clarinet Solo Changes The Map For Music Technology

Imagine this: You pull out your MP3 player to choose the tunes you'll need to download for your next vacation. You start to worry about what to cull, what to keep, then remember storage isn't an issue anymore, considering your music files are, oh, 1,000 times smaller than they used to be.

If University of Rochester professor of electrical and computer engineering Mark Bocko and doctoral students Xiaoxiao Dong and Mark Sterling have their way, this scenario could happen in the not-too-distant future. Bocko and his team have artificially created a digital, 20-second clarinet solo that is less than one kilobyte in size, by virtue of programming that captures both the physics of the clarinet and of the human player.

Using a generic laptop with a Matlab programming environment, the researchers first measured the acoustic input impedance, a frequency that is "the ratio of the acoustic pressure to the air flow velocity at the input of the clarinet bore" in order to create an algorithm to represent the clarinet, explains Bocko.

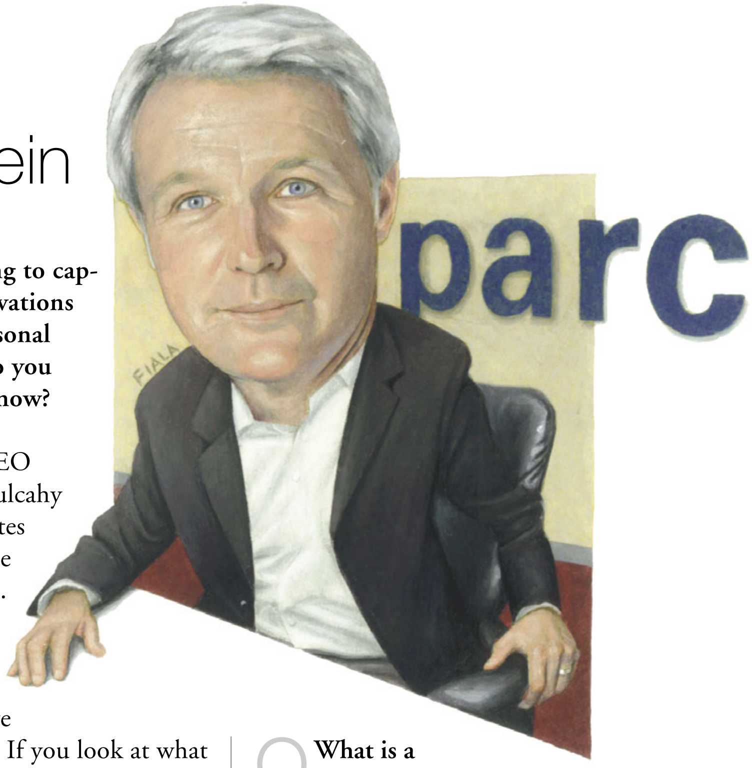
With the player, the team accounted for the effects of the human vocal tract and how it melds with the clarinet's acoustic impedance. They also included the player's blowing pressure, fingering, and the energy with which they clamp down on the reed. "Tonguing" of the instrument at the start of notes in staccato passages was difficult to re-create, but was recently improved in the algorithm.

"Making accurate measurements was the biggest challenge by far," Bocko says. Though they are still working on creating the sounds in real time, "it takes a couple of minutes to synthesize 20 seconds of music."

"We are in the process of transferring the algorithms to a dedicated digital signal processing platform to speed up the simulations to real time," Bocko adds.

Although the result of the team's work differs from current technology in that it is not actually a recording of music, Bocko muses that artificially reproducing may one day replace actually recording it. For now, Bocko and his fellow researchers are working on perfecting that reproduction, with no plans for licensing their technology until they can satisfy the ears of the very players they are re-creating.

# Q&A With Mark Bernstein



The Xerox Palo Alto Research Center let a big one get away. The company made one of the bigger miscalculations in the history of business when it missed the personal computer revolution. PARC's researchers created a lot of the fundamental technologies behind the PC, including the computer mouse, but Xerox failed to turn the inventions into products. It took Steve Jobs, co-founder of Apple and a visitor to PARC, to take those ideas and turn them into a gold mine. Mark Bernstein, now director of PARC, is in charge of the vaunted research campus in the hills above Silicon Valley. His job is to make sure Xerox doesn't fumble the future again.

Q **What are some of the new PARC inventions?**

MB We are focused on photovoltaic printing. We are creating materials that increase energy efficiency. We focus on particle manipulation, using principles of xerography and toners to create a filtration process where you can remove particles from water. We use a unique spiral filtration mechanism where heavier particles are siphoned off to sidewalls, leaving clean water. In another project, we are also focused on adaptive energy with constraint-based modeling. We developed it to allow complex printing machines, which are electromechanical robots, so we can control all aspects of a printing process. We modularly assemble a process in data centers where we can reduce the amount of energy used in data centers. It sits on top of virtualization engines and does a better job at energy control. It provides the right level of resources for a submitted job. You can optimize the job load over time.

Q **Some people characterize Xerox as the company that fumbled the future by failing to capitalize on the innovations that led to the personal computer. How do you look back on that now?**

MB Xerox CEO Anne Mulcahy and I compared notes on how often we are asked that question. It's generally every time. I got to PARC about three months before Steve Jobs made his visit. If you look at what happened, it's very understandable. There are two basic questions people ask. Why didn't Xerox become a computer company? At that time, Xerox was making 13 to 15% after-tax profits. The existing business groups didn't see the benefit of adopting risky technology that it didn't understand when its business was going quite well. How could Xerox have created an organization sooner than it did to capitalize on what PARC did? They did a very good job capitalizing on the laser printer that was invented here.

Q **How do you keep your scorecard?**

MB We have a business plan we develop every year. We've exceeded our plan the last three years. Different parts of the business model have been prominent in any one year. Underlying all that are simulations and models where we constantly refine our projects and how soon they will get to market. We have various scenarios and outcomes. We expect we can be very successful over five to seven years. We have a lot of value in our patents and the equity in start-ups we've started. We have to work on things that are challenging and important.

Q **What is a big new technology you see coming?**

MB One of the competencies we have bet on for 30 years is linguistics technology that tries to understand the meaning of words and phrases, rather than just keywords. If you take a step back and look at the grand challenge, it's not like 10 years ago when it was getting 1 million responses to your search term in 0.4 seconds. Google has performance and does it in a short amount of time. The issue is not about how much information you get but how much information comes to you that is important. It has to have something to do with what you need and when you need it. You have to be connected all of the time. We need better tools and better technologies that really optimize the human capacity. We use this curve on the increase of information and the increase in human capacity. The latter is a flat line. We have maxed out the human perceptive and cognitive capabilities. Now we have to do a better job of filtering or fusing information. That to me is the Holy Grail for the next century. ▲

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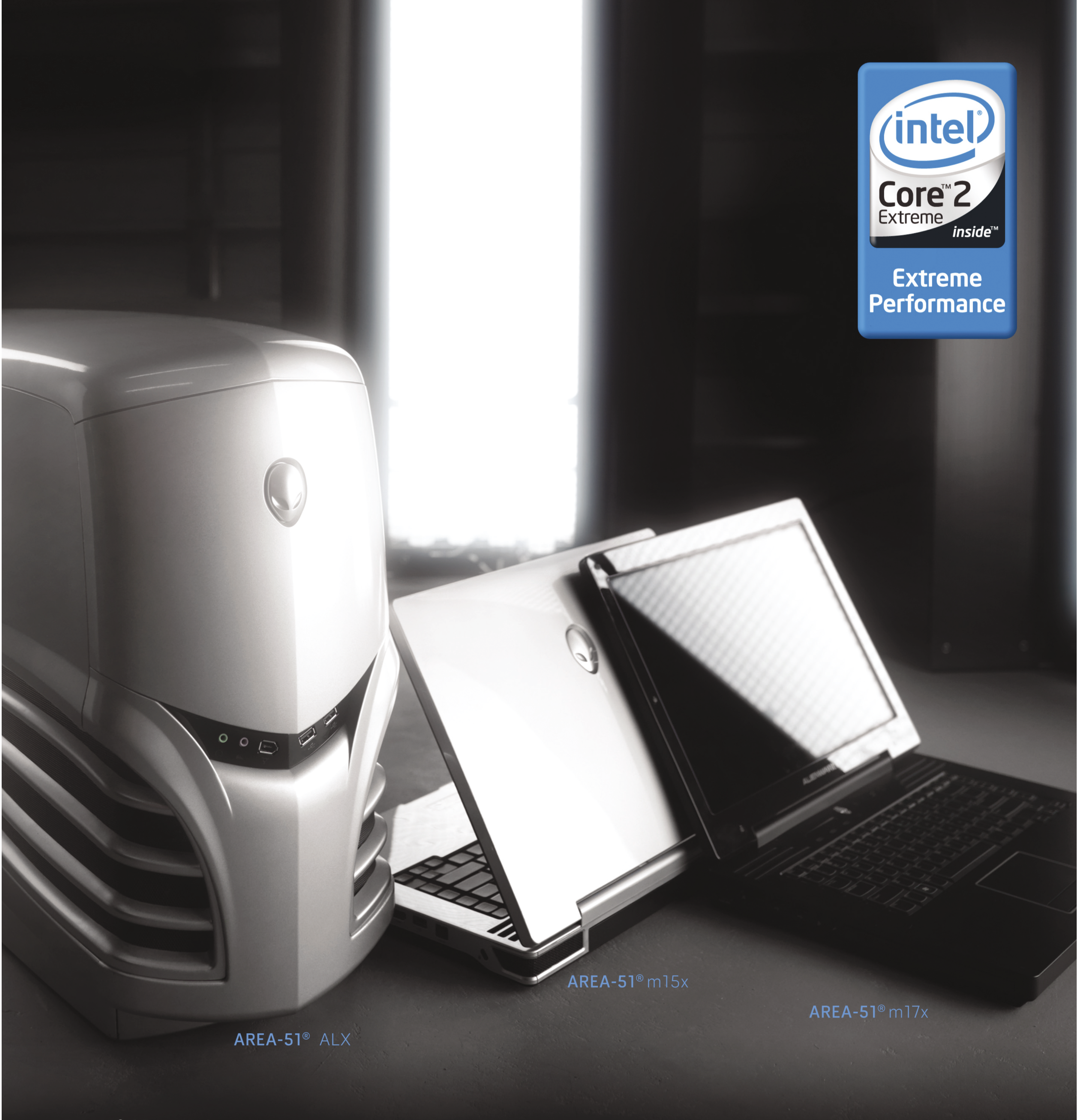

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